Road Services Division
2017 – 2018 Line of Business Plan

September 16, 2016

King County
Department of Transportation

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1. Introduction

The Road Services Division is holding steady on the course set by the adopted Strategic Plan for Road Services and mapped in the Line of Business Plan for the last biennium.

Critical safety work remains the top priority for 2017 – 2018. With insufficient funds for a full preservation program or timely replacement of infrastructure, available revenues are focused on reacting to the higher risks associated with the deteriorating road system. It has been more than a decade since a new capacity project has been funded and preservation projects have been limited. The six-year capital improvement program is significantly diminished from past years and is focused on addressing deterioration rather than planned preservation and maintenance. The division anticipates the need to continue to focus available resources on unplanned failures and system deterioration and recognizes not all of these needs will be met and assets will close.

Efforts continue to focus on operations and implement additional efficiencies in both the approach to the work we do and the equipment and materials used. Other county agencies have provided assistance in identifying opportunities for savings, efficiencies and new ways of doing business. These partnerships have assisted us to focus available resources on the most critical issues facing the road system and its users.

Reductions to work groups that provide maintenance, engineering, and administrative support to the road system occurred in previous budget cycles, and Roads has reached a stable staffing level consistent with the funding projections for the next several years. The division has also limited its commitments to provide engineering, project management, and general maintenance work for cities and other agencies in order to fully focus the agency on keeping county roads and bridges as safe and functional as possible.

Bridges and Roads Task Force

In August 2015, the County Executive and Councilmember Lambert invited a panel of regional leaders and community members to meet and explore solutions for maintaining and preserving the aging bridge and road system in unincorporated King County. The Bridges and Roads Task Force membership included neighbors, representatives from agriculture and recreation organizations, road experts and public policy leaders. The Task Force reviewed the background, history, and the analysis of an independent consultant that identified a funding gap of $250 million to $400 million a year to maintain, replace, and improve county bridges and roads. In January 2016, the Task Force made several findings and recommendations. Key recommendations included:

- **Revenue:** The county needs new authority from the state legislature for a fair, non-regressive countywide revenue tool that is tied to inflation, is sustainable over the long-term, and provides a benefit to both cities and the county.
- **Infrastructure:** The county should work to transfer urban road segments that are orphaned, islands of roads within a city or cities, and Potential Annexation Areas (PAAs) within the growth boundaries of cities into those jurisdictions. This may require additional authority from the state legislature and support for recipient cities.
- **Further Study:** The county should study other funding options that would directly tax utilization and address the overall decline in gas tax revenues caused by fuel efficiency gains and reduced fuel consumption. These alternatives could include taxes or fees

based on various road pricing options including vehicle miles travelled, congestion pricing, and/or tolling.
- **Outreach:** The county should expand outreach to all stakeholders to increase awareness of the problems Roads faces.

Following the Task Force recommendation, King County proposed legislation that would allow the county council to transfer orphan roads to the appropriate city. Additionally, it incorporated other Task Force ideas including language to modernize the functions of the county road engineer and the division's record keeping, and allowed for a consideration of nonmonetary compensation and public benefit to allow for the vacation and transfer of unnecessary right-of-way. The legislature removed the request to transfer orphan roads but adopted the remaining provisions. The division is actively working to incorporate the new law into county code and practices.

About this plan

Roads has produced business plans for over a decade, and this is the second official plan to incorporate the Line of Business approach from the county's performance management model. This plan uses a product-oriented framework to look at the division's business, both over the next biennium and 10 years into the future. It includes a catalog of the products, or infrastructure assets, and illustrates how the proposed 2017 - 2018 budget investments align with those products and our customer's experience of the county road system.

This approach has allowed Roads to better link the budget to its adopted strategic priorities and asset management framework. It also provides a powerful tool to communicate to elected officials and the public about what current resources are "purchasing" and why specific resource allocation choices were made.

*A **Line of Business** is defined as the processes that produce a highly-related family of products that, when combined, fulfill a business or customer need. A line of business may cross existing organizational boundaries to serve a common purpose.*

Lines of Business are the high-level units for which King County leaders "check" operational performance and problem-solve. Strategic plans are implemented operationally through Lines of Business.

This plan links and supports the county's Strategic plan, implements the roads elements of the King County Comprehensive Plan and demonstrates the division alignment with executive priorities - equity and social justice, climate change, best run government and regional mobility.

About the division

Roads is one of five divisions in the King County Department of Transportation. It is responsible for all county-owned roads, bridges, and related infrastructure in the unincorporated areas of the county, and must meet the road-related transportation needs of a very large and diverse service area. The county's many bridges are an integral part of the road system, as are other components such as sidewalks and pathways, bike lanes, guardrails, drainage and water quality facilities, traffic control equipment, and traffic cameras.

The division's organizational structure consists of the Director's Office and three sections: Maintenance, Engineering Services, and Strategic Business Operations. Overall the division is organized to focus on key functions and skill sets that best meet the strategic plan goals of safety and regulatory compliance, and to ensure that the proper resources are available to respond to unplanned failures and emergencies.

Roads products/assets

Due to an extraordinary level of outreach to stakeholders and partners over the last six years, the division has a solid understanding of its customers, the products it delivers to them, and the business processes that contribute to the desired attributes of those products. Roads worked closely with senior county leadership and the Office of Performance, Strategy and Budget to articulate a product oriented approach to process management. Consistent with the division's asset management framework, the product families included correspond to the categories of infrastructure assets the division is responsible for managing. These products, and the attributes customers expect to receive from them, are shown in Figure 1.

This approach provides a systematic way to analyze and articulate what we do, why we do it, and how we do it. It provides a framework for evaluating costs and impacts on value provided to customers. That understanding has allowed the division to undertake the continuous improvement processes needed to identify and eliminate activities that are adding little or no value.

If the road miles of unincorporated King County were laid end-to-end they would stretch from Mexico to the Canadian border and beyond.

Figure 1


PRODUCTS &
DESIRED ATTRIBUTES
• Meets safety and environmental standards
• Free of hazards
• Accessible for emergency vehicles
• Usable during snow events
• Smooth ride
• No load limits or undue speed restrictions
• All lanes open
• Reliable travel time
• Free of litter/debris
Roadway
• Meets safety and environmental standards
• Free of hazards
• Open
• No load/height restrictions
• Nonmotorized access
• Minimal crossing delays
• Free of litter, debris, graffiti, bird guano
Bridges/ structures
• Meets safety and environmental standards
• Water on roadway causes minimal impact to travelers
• No water damage to infrastructure or private property
• Good water quality
• Ponds, ditches and enclosed drainage system free of litter/debris
• No mosquitos in road-related ponds or ditches
Drainage
• Meets safety standards
• Restrictions clearly marked
• Damaged signs replaced
• Traffic signs, stripes and markings visible night and day
• Intersections operating efficiently (for safety and optimal traffic flow)
• Traffic control systems operating correctly
• Information is accurate, clear, appropriate
• Free of graffiti
Traffic control
• Meets safety and environmental standards
• Free of hazards/obstructions
• Good sight distance
• Guardrail where appropriate
• Vegetation does not interfere with road use
• Clear, unobstructed area for nonmotorized use and for vehicles that leave roadway
• Mitigation of slide and washout risk
Roadside

The unincorporated-area road system owned and managed by Roads includes the following asset inventory (numbers are approximate):[1]

- 1,469 miles of roadways
- 181 bridges, including several jointly owned with cities
- Over 44,620 traffic control signs
- 79 traffic signals
- 114 miles of protective guardrail
- 52 traffic cameras
- 4.7 million feet of drainage ditch
- 3 million feet of drainage pipe

The average age of county arterials is approximately 93 years and local roads 49 years.

The county road network enables travel between cities and other counties. County roads are necessary links for the movement of people, utilities and goods throughout the most urban and dense county in the state. These roads—built generations ago—are failing and there is insufficient funding to maintain and replace them. Our connectedness hinges not just on high-profile arterials, but on many miles of ordinary and unremarkable roads, culverts and bridges that travelers mostly take for granted. The Bridges and Roads Task Force identified a need for a regional funding source so the county can continue to provide these vital connections between communities.

Roads in the county's rural area are some of the oldest in the system, and are the most vulnerable to falling trees and debris, floods, and snow storms, as roads run alongside rivers and streams, through heavily wooded areas and at higher elevations.

Our customers

More than one million trips are taken on King County's unincorporated road network each day. In addition to unincorporated residents, more than a quarter of a million other people also use the same roads and bridges to commute to school, work, and recreational activities, to move goods from farm to market, and as routes for freight and businesses.

Public service providers, such as police, fire, emergency medical responders, and Metro Transit, are also key customers of the county's unincorporated-area road system. In addition, the road right-of-way serves as a pathway for delivery of utilities and services including: water, sewer, stormwater, energy, and communication utilities. All of these users expect effective and reliable access to and through the county right-of-way.

In King County, 12 percent of the total population pays for the unincorporated area road system that supports over a million trips per day. This is because King County is the only county to have so completely implemented the state's Growth Management Act, which calls for small, dense, urban areas of high-value properties to be annexed into cities. The system for funding county roads didn't contemplate growth management, and it doesn't leave sufficient revenues to keep the roads functioning even at current levels.

[1] Based on 2015 Roads inventory data and the 2016 Klahanie Annexation

Another group of Roads customers are cities and other county agencies that purchase road-related services such as maintenance, construction and engineering support. When cities first incorporated or annexed territory the division performed a large amount of work for these customers. Now that cities have created their own public works departments, the division has eliminated commitments to others to perform general maintenance and engineering work in order to focus on maintenance of the county's unincorporated road system. The division continues to provide services for more technically complex work like bridge inspection, materials testing, and traffic signals. This work is appropriate for a regional public provider because most other small agencies cannot support specialized staff for occasional projects, and these are services that are typically less available in the private sector. Roads avoids work for other agencies that present a seasonal conflict with work necessary on county roads, like sweeping leaves.

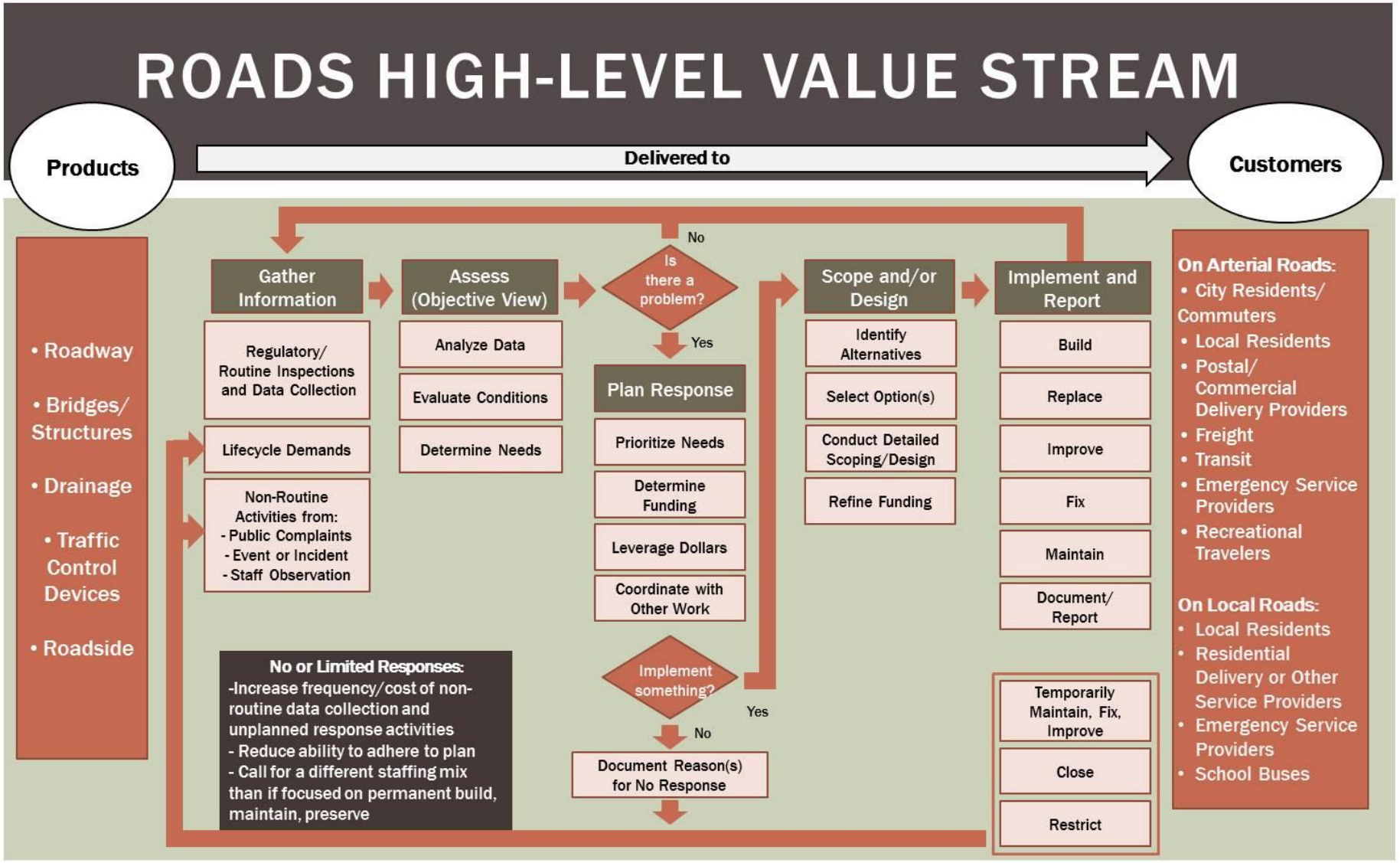
Roads Division customers include:

- *Commuters*
- *Local residents*
- *Freight*
- *Transit*
- *School buses*
- *Emergency service providers*
- *Recreational travelers*
- *Utilities and other public service providers*
- *Residential delivery services*
- *Jurisdictions/agencies that purchase road-related services from the division*

Value stream

A value stream map is a visual representation of the major processes and activities involved in bringing a product or service to the customer from demand to delivery. Roads has analyzed its primary business processes as depicted in Figure 2.

Figure 2


ROADS HIGH-LEVEL VALUE STREAM
Products
Delivered to
Customers
• Roadway
• Bridges/ Structures
• Drainage
• Traffic Control Devices
• Roadside
Gather Information
Regulatory/ Routine Inspections and Data Collection
Lifecycle Demands
Non-Routine Activities from:
- Public Complaints
- Event or Incident
- Staff Observation
Assess (Objective View)
Analyze Data
Evaluate Conditions
Determine Needs
Is there a problem?
No
Yes
Plan Response
Prioritize Needs
Determine Funding
Leverage Dollars
Coordinate with Other Work
Implement something?
Yes
No
Document Reason(s) for No Response
Scope and/or Design
Identify Alternatives
Select Option(s)
Conduct Detailed Scoping/Design
Refine Funding
Implement and Report
Build
Replace
Improve
Fix
Maintain
Document/ Report
Temporarily Maintain, Fix, Improve
Close
Restrict
No or Limited Responses:
-Increase frequency/cost of non-routine data collection and unplanned response activities
- Reduce ability to adhere to plan
- Call for a different staffing mix than if focused on permanent build, maintain, preserve
On Arterial Roads:
• City Residents/ Commuters
• Local Residents
• Postal/ Commercial Delivery Providers
• Freight
• Transit
• Emergency Service Providers
• Recreational Travelers
On Local Roads:
• Local Residents
• Residential Delivery or Other Service Providers
• Emergency Service Providers
• School Buses

Strategic context

In July 2014 the council approved an update to the Strategic Plan for Roads Services. That plan, which includes a funding and needs analysis, policy framework, goals and strategies, alternate service delivery scenarios, and facilities planning guidance, serves as the strategic context for this Line of Business plan.

Roads mission and vision are as follows:

> Mission
>
> Manage the unincorporated King County road system through focused investment of available resources to facilitate the movement of people, goods and services, and respond to emergencies.
>
> Vision
>
> A resilient, sustainably funded, unincorporated urban and rural road system that supports our communities and the economy by connecting people to employment, education, commerce and recreation, and is well-integrated with the regional transportation network. This is achieved through a lowest-lifecycle-cost approach to effective infrastructure maintenance, preservation, and improvement.

The strategic plan responds to the dilemma of significantly constrained resources by setting clear priorities to guide the division as it manages the road system. The plan outlines two types of goals as shown in Figure 3. “What we deliver” goals articulate, in priority order, what the division intends to accomplish, and “how we deliver” goals articulate how the division intends to conduct its work. In general, “what” goals relate to the products and services provided to the public, and “how” goals speak to the internal aspects of services (such as cost-efficiency).

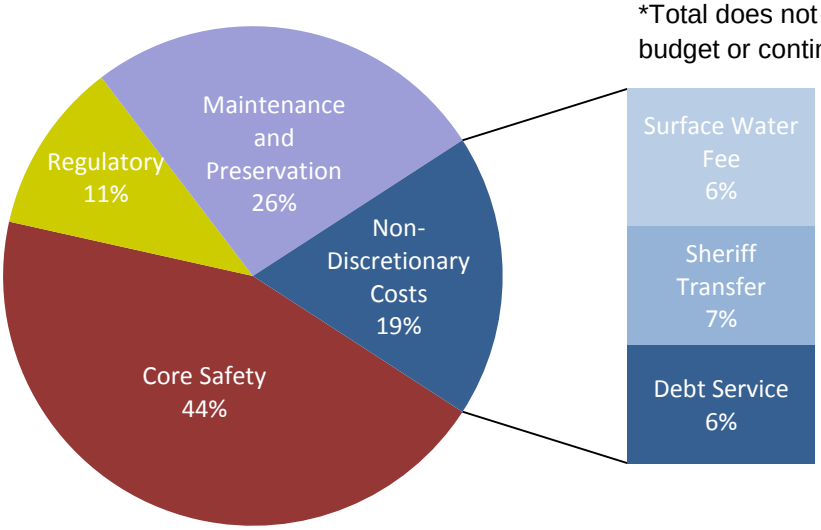
Figure 3

Roads used these goals and priorities to build its 2017 - 2018 budget and six-year capital improvement program, which results in funding safety and regulatory work first and then, due to revenue constraints, a limited amount of preservation and maintenance activities. The division is currently unable to fund mobility and capacity work. Figure 4 provides an overview of the alignment of the 2017-2018 budget and capital improvement program with strategic plan priorities.

Figure 4

Total 2017 - 2018 budget* = $210 million

*Total does not include reimbursable services budget or contingent budget authority



Strategic Focus Areas for 2017 – 2018

Roads has identified five strategic focus areas specifically for the 2017 - 2018 biennium:

- *Safety*
- *Financial and operational sustainability*
- *Workforce*
- *Water/drainage*
- *Maintenance facilities*

These, in addition to the strategic plan goals, have guided budget development and will form the framework for performance reporting. Progress will be communicated through several means including visual management systems, such as performance boards (also known as tier boards) at the division, section, and work unit levels.

This plan is structured to present each strategic focus area with its key challenges and connect to the related 2017 - 2018 budget initiatives.

Text boxes like this one throughout the document highlight key challenges associated with each focus area.

2. Current Situation - Rough Road Ahead

Budget environment past and future

King County is experiencing a roads funding crisis, due to municipal annexations, the 2008 recession, declines in gas tax revenues, the effects of voter initiatives, and an aging bridge and road system. The lack of revenue is significantly impacting the county's capacity to maintain and improve roads.

Strategic Focus Area:
FINANCIAL AND OPERATIONAL SUSTAINABILITY

Key Challenge: Insufficient funding results in deterioration of the road system

- *Current funding levels do not support needed levels of service for road assets*
- *Infrastructure is aging and deteriorating or failing in many locations and funds are not available for corrective actions.*

The county receives revenues for roads primarily from three sources; a dedicated property tax on unincorporated properties, federal and state grants, and gas tax. The dedicated property tax and gas tax provide the largest portion of funding for Roads (72% in the 2017 - 2018 biennial budget).

The property tax is tied to the assessed value of properties in unincorporated King County. During the recession, property values in unincorporated King County dropped sharply. While the economy has shown signs of recovery, future growth in revenues is significantly limited by state law, which restricts the growth of property taxes generally to one percent per year plus new construction. Inflation alone, even during the recession, was often greater than one percent. In addition, there is only a modest amount of new construction occurring outside of cities. Revenues for county roads are not predicted to recover in real terms during the horizon of this plan. Gas tax revenues had a roughly 8% increase due to the passage of the state transportation package, but are expected to decline over time with more fuel efficient vehicles and a decline in the allocation to King County due to reduction in road miles from recent and projected annexations.

As in the last biennium, in 2017 - 2018, the county will have limited capacity to deliver road services. Conditions on the road system will continue to deteriorate and resources must be focused on immediate critical safety needs. Reduced service levels means activities like managing overgrown vegetation or litter that is unsightly,

The Klahanie annexation that occurred in 2016 removed $4.8 million in revenue or 6 percent of total property tax revenue. However, only 27 road miles, or 1.8 percent of the total mileage left the county road system.

but not yet a safety issue, will be delayed or foregone. In order to ensure that higher priority, immediate operational safety activities are addressed, other maintenance activities have been reduced or cut.

Events of the last decade have had profound impacts on the county road system. Over the past twenty years, cities have formed and annexed the urbanized, denser areas of the county consistent with the Growth Management Act and county policy. Several large geographic areas – with their associated tax base – left the county road system. The amount of funding lost, versus the number of bridges and road miles transferred to other jurisdictions in annexations, was often not proportional.

In the early 2000's, voter initiatives, followed by state legislation, eliminated the local vehicle license fee and limited the amount of road levy funds that can be collected. These changes resulted in a significant decline in revenue, and a reduction in maintenance, operations, and capital improvements. The financial impacts continued to grow and compound in subsequent years and the road system deterioration is accelerating as a result.

The total unincorporated area assessed property value has fallen by more than 30 percent since 2009. While property values have shown some signs of recovering, the restrictions on tax growth have not allowed revenues to recover and it will be years before revenues return to pre-recession values in real terms. Aggravating these impacts, gas tax revenues for counties have and are expected to continue to trend downward as vehicles become more fuel-efficient. The end result is a tax base that does not support the cost of maintaining the existing and future road system needs.

Needs estimates and costs

A financial consultant recently estimated it would cost upwards of $400 million to $500 million annually—for a period of more than ten years—to fully address the current backlog of road system needs, embark on an asset management program that produces the lowest life cycle costs and brings the system to a state of good repair, address future maintenance facility needs, and the road capacity, mobility and non-motorized needs identified in the Transportation Needs Report. Based upon information and forecasts provided by the Office of Economic and Financial Analysis for property tax and the Washington State Department of Transportation for gas tax, the division estimates that the average revenue for the next ten years is about $100 million annually – less than half of the estimated $220 million needed just to moderate the decline of the system and to minimize risk. Under these financial constraints, the 2017 - 2018 biennial budget focuses limited resources on delivering the most critical services. However, the reduced ability to care for infrastructure assets will lead to further deterioration of county roadways. Eventually, the lack of preservation and maintenance will force speed and weight limitations, bridge and road closures, detours, and longer travel times.

As part of the Bridges and Roads Task Force effort, BERK Consulting was hired in 2015 to conduct a review of Roads' methods, assumptions, data, and documentation used to create the strategic plan financial need estimates. BERK found that Roads' estimates were based on reasonable methods and assumptions appropriate for planning and policy discussions. They also concluded that there is a significant level of uncertainty around many of the key assumptions and available data, which suggests that a better approach is to consider how this uncertainty might result in a reasonable range of funding levels to meet the stated goals for each funding scenario. BERK developed

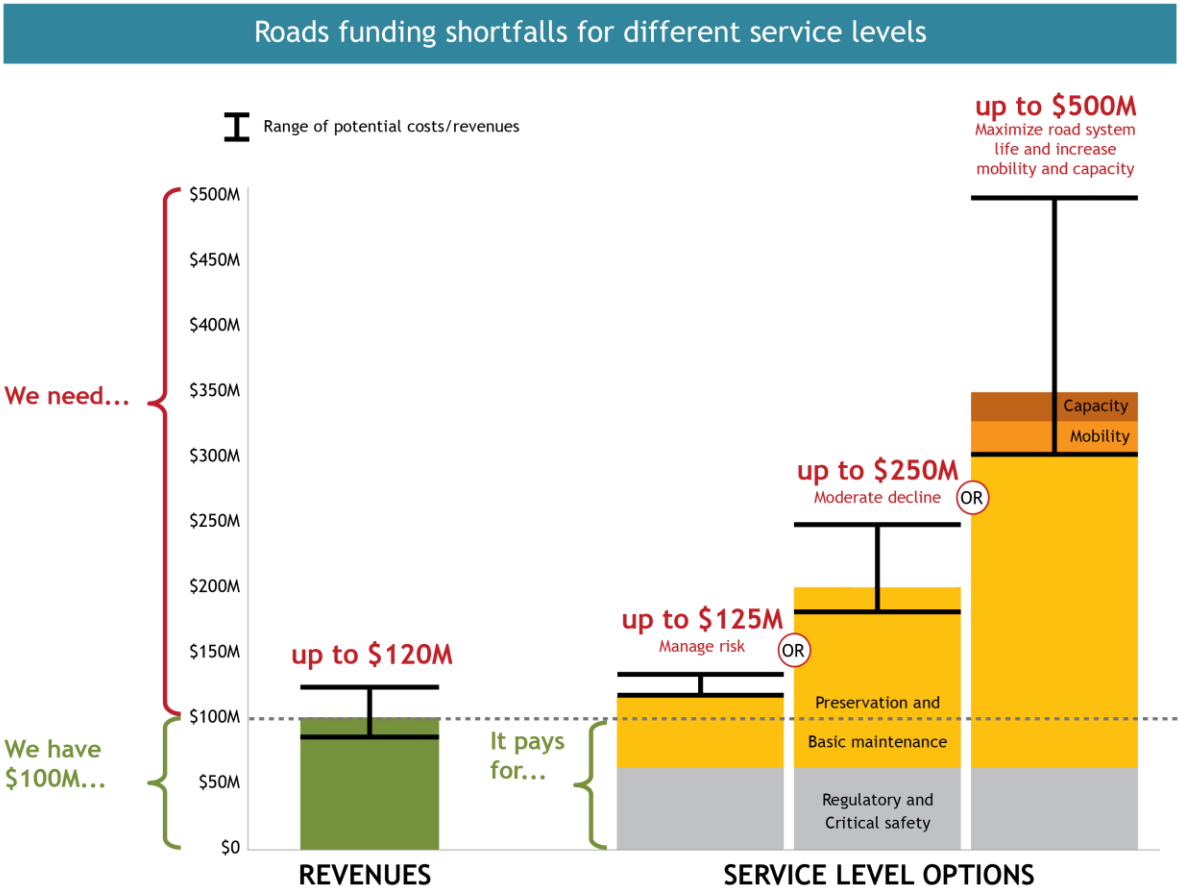
Planning-Level Estimates

The expected costs based on average project or unit costs, as opposed to a specific design. Planning level estimates do not account for site-specific issues that may come up in individual project design and implementation.

alternative cost estimates based on variations in underlying assumptions and used this information to generate an overall range of funding need for each service level scenario.

Using industry research as well as updated information provided by county subject matter experts, BERK developed a set of refined estimates and updated the Strategic Plan estimates using Road Services Division's financial model. A key factor in the refined estimates is an attempt to quantify the effect of risk and uncertainty on estimates of cost, which results in a range of potential costs to achieve a given policy outcome. A range of costs also better describes the actual funding challenge because a single number suggests a precision that is not appropriate for planning-level estimates and runs the risk of understating what it could take to achieve some of the policy goals in each scenario. Figure 5 presents Road Services Division's original strategic plan estimates with BERK's refinements presented as partial range bars around the mid-level and high-level funding scenarios. Road Services Division's estimates are 70% below the upper bound in the mid-level funding scenario and 75% below the upper bound for the high-level funding scenario.

Figure 5



Six year capital program ($144 million)

The county is losing significant ground in its battle to preserve aged infrastructure and to modernize and provide efficient functioning of its heavily used road system. The Roads Capital Improvement Program is no longer able to keep pace with or make a net gain in the growing backlog of infrastructure needs. With reduced revenues, maintenance, repairs, and replacement are deferred and the backlog expands. This deferral will lead to an exponential increase in the cost to repair and sustain these roads in the future. According to the American Association of State Highway and Transportation Officials, every dollar spent to keep a road in good condition avoids six to fourteen dollars needed later to rebuild the same road once it has deteriorated prematurely. Essentially, the infrastructure experiences a shorter lifecycle, and therefore, a higher lifecycle cost.

The 2017 - 2022 Capital Improvement Program (CIP) reflects an ongoing and evolving response to significant structural funding challenges that are affecting the county's ability to preserve and maintain the roadways in unincorporated areas. The proposed six year CIP totals $144 million, significantly less than historic levels (Fig 6). More information on the details of the CIP can be found in the CIP narrative document.

The majority of the expenditures are identified for preservation and replacement programs such as pavement preservation and drainage facility rehabilitation, and the remainder is identified as reserves for unplanned failures and emergencies. Roads has a legal funding cap that limits revenue growth to a rate well below the growth in operating costs. Over time, the increasing cost of our current service levels will result in decreasing funds available for the capital program. As shown in Figure 7, if no new sustainable funding sources become available, Roads will reach a point within the next decade or so where no funds remain for the capital program. Subsequent to this, not only will there be no capital program, but Roads will be forced to reduce operating program services just to make ends meet.

Figure 6

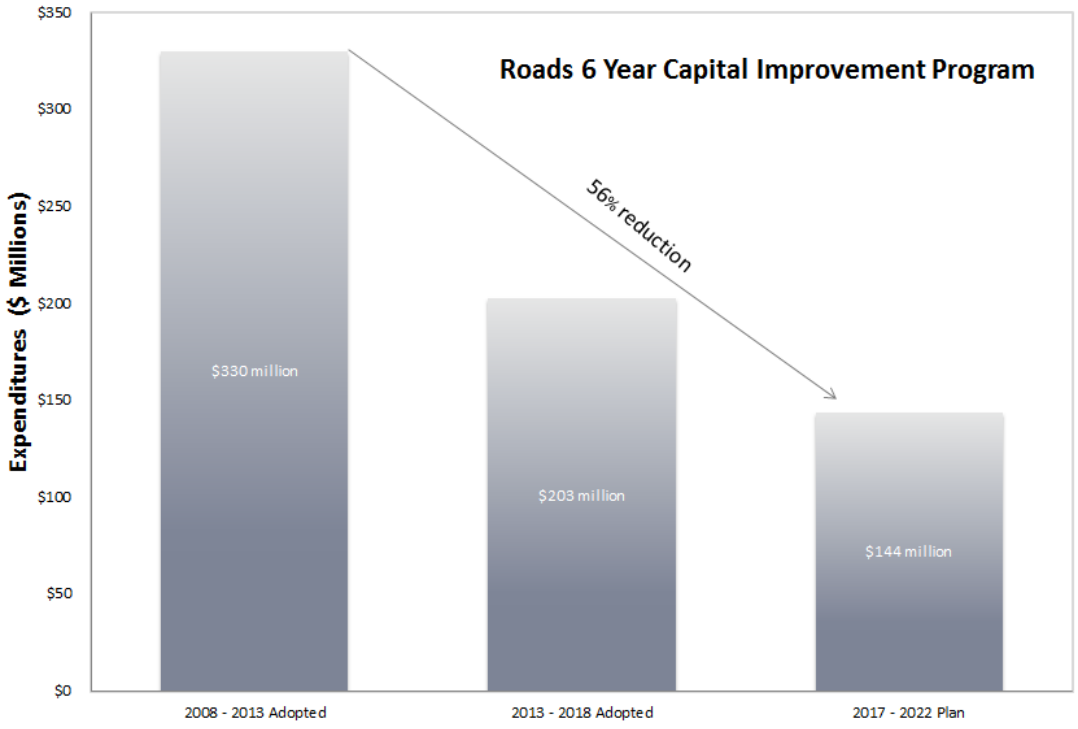
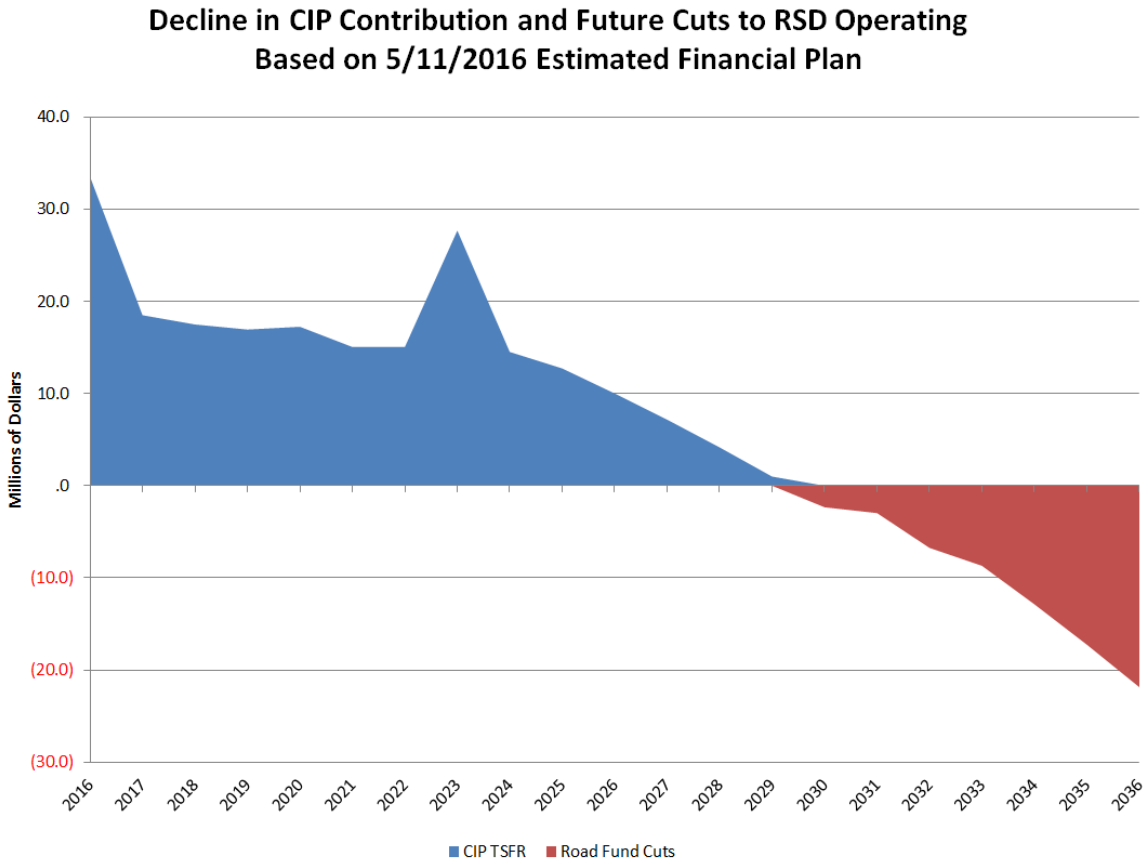


Figure 7


Decline in CIP Contribution and Future Cuts to RSD Operating
Based on 5/11/2016 Estimated Financial Plan
Millions of Dollars
40.0
30.0
20.0
10.0
.0
(10.0)
(20.0)
(30.0)
2016
2017
2018
2019
2020
2021
2022
2023
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2036
CIP TSFR
Road Fund Cuts

3. Best Run Government - Improvements and Efficiencies

In response to its ongoing funding crisis and consistent with the King County Executive's Best Run Government initiative, Roads has been making a concerted and active evaluation of all aspects of its business, work locations, tools, equipment and materials. Services and service levels have been evaluated and modified. The types of efficiencies achieved and or underway are outlined below.

Focus on core services

- Reduced contract work to cities and other agencies, returning focus to county roads
- Eliminated some less essential services
- Reduced reliance on undependable revenue from other agencies

Staff reduction and reorganization

- Reduced more than 40% of workforce by combining or eliminating jobs
- Reorganized five sections into three
- Realigned teams and adjusted job classifications
- Worked with unions to identify contract and work efficiencies
- Adjusted core work hours and use of flex schedules
- Training/retraining staff
- Working with labor to increase flexibility in maintenance staff job opportunities

Maintenance facility consolidation

- Developed facilities master plan
- Re-organized maintenance division boundaries to improve travel time
- Closed three facilities - consolidated staff, equipment and supplies in remaining six
- Reduced energy consumption associated with field operations
- Improving facilities to increase operational efficiency (ongoing)
- Selling surplus properties (ongoing)

Decreased overhead

- Consolidated facilities and office space to reduce our footprint by nearly 40%
- Reduced fleet inventory by more than 20%
- Reduced radios, computers, phones and other operating equipment
- Converted county-owned street lighting to LED technology to reduce energy costs

Leveraged technology

- Implemented state-of-the-industry asset management and work order system - creating $1.2 million per year in efficiencies. For additional detail, see section below entitled, 'data driven asset management'
- Implementing automatic vehicle location technology for more efficient dispatch, better fleet management, and effective data collection
- Standardizing software systems for more efficiency and reliability

Process improvements

Roads is committed to continuous improvement and has undertaken numerous process improvements at various levels of the organization. Examples include:

- Maximized asset data collection capabilities by centralizing staffing resources and eliminating the duplication of data collection
- Consolidated maintenance clearing and grading permit requirements from three to one consolidated permit
- Improved road closure alert process for more timely and accurate data to public
- Replaced time-intensive manual travel time data collection for the concurrency program with data purchased from a leading traffic data vendor
- Reduced the time needed for mandated catch-basin inspections and cleanings in order to comply with increased regulatory requirements using existing resources
- Improved response time to inquiries from constituents and eliminated backlog to ensure better communication and identification of safety issues
- Improved the process for reporting job-related injuries, to allow employees quicker access to needed services that help them get back to work sooner
- Streamlining and standardizing the process for performing city services work
- Streamlined records management functions and reduced storage needs for old records that were past retention requirements

Partnerships

Roads maintains productive partnerships with:

- Solid Waste Division to take organic street waste material to Cedar Hill Landfill in lieu of costly processing
- Labor unions and other agency partners to supplement snow and ice response staff
- Water and Land Resource Division to assess the condition of regional drainage systems in the right-of-way
- WSDOT to share maintenance facilities at Star Lake, Skykomish and Preston
- City of Issaquah on potential solutions to the Issaquah Hobart Road congestion issues, including joint study on Issaquah Hobart Road from I-90 to SR 18
- City of Sammamish, to negotiate city taking over maintenance of certain road segments of Duthie Hill Road and Sahalee Road adjacent to the city and to jointly pursue grant opportunities
- The Assessor's office to create the first comprehensive database of property either owned by or deeded to roads.

Reducing road inventory

- Transferring orphaned roads to adjacent cities
- Vacating roads to other agencies and adjacent property owners
- Stopped converting small private roads that serve a limited number of properties to county-maintained roads

2017 – 2018 Best Run Government Priorities

Additional detail for 2017 – 2018 activities of particular emphasis are profiled below. These are responsive to recommendations generated by the Bridges and Roads Task Force.

Ongoing emphasis on transferring orphaned roads

Orphaned roads are half-streets, parts of roads completely surrounded by cities, and small segments of road located on or within the Urban Growth Boundary, that were not transferred from county responsibility to a city. Most are a result of an administrative, leftover problem created during annexations by cities and towns, leaving unincorporated counties with small parts of roads, often very far from the county's core service area, its maintenance crews and facilities.

It is difficult to maintain these roads in urban areas. Some roads have ownership split between the county and a city along the center line. It is impractical to maintain only half a road, and there are liability issues with split streets. In addition, sending crews extended travel distances into urban areas to provide service on small road segments is costly, inefficient, and it is time not spent on critical corridors in the county's core service area.

King County is actively working with cities to negotiate transfer of orphan roads to surrounding/adjacent jurisdictions. Although the legislature did not adopt changes to state law during its 2016 session, it may be necessary to continue to seek such changes to state law to achieve orphan road transfers.

Increased emphasis on road vacations and right-of-way transfer

The county road system includes many roads built over more than the last one hundred years from various materials on varying grades with different drainage systems and issues. Some roads serve a few properties and some serve thousands of drivers every day. Roads is working to identify right-of-way and other property interests that are not essential for the roads network and could be transferred from out of county responsibility.

Continuous process improvement

Over the past six years, Roads has embraced the use of continuous improvement methods and tools. There is a growing interest in process improvement, at all levels of the organization, to streamline work practices and reduce strain to employees. This is particularly valuable given the over 40% reduction in division staffing.

The division currently has five staff trained as Lean facilitators who provide capacity to lead process improvement efforts, as well as coach and train staff in Lean methods and tools.

Some of the future process improvements may also leverage technology, such as increased use of mobile devices and geospatial databases, to improve access to information and automate routine tasks.

Data-driven asset management

The Road Services Division has replaced paper-based service requests and work orders for its "boots on the ground" maintenance function with a state-of-the-industry, GIS-centric asset management system called Roadworks. In creating this enterprise system, Roads supplanted more than 50 data silos with a single system, which is now used by employees from crew chiefs to senior management. The resulting business process efficiencies are estimated to be saving the division at least $1.2 million per year -- resources that are being redirected to providing essential public services. The improvements are also

reducing the lag time between receiving customer service requests and assigning them to maintenance crews from days to minutes, and expanding the division's asset management capacity by building location-specific work history data, including costs.

The project benefits to date include the following efficiencies and cost savings.

- **More efficient driving routes** - The ability to better plan maintenance staff driving routes based on mapped location of service requests and work orders saves Roads approximately 3,900 staff hours or $550,000 per year.
- **Elimination of extraneous travel and travel time reduction** – The ability to access information in the field has eliminated the need to physically drive to other locations to gather necessary documentation (construction plans, work history records etc.) and saves approximately 2,600 staff hours or $300,000 per year. A recently initiated pilot project deployed traffic signal technicians directly to remote site locations rather than starting and ending their work day at the office. This change is facilitated by the Roadworks system and mobile technology. Elimination of unnecessary travel time is expected to save approximately 1.5 hours of travel time per day per employee, for a productivity increase of 18 percent.
- **Elimination of repeat investigative work** – Shared access to mapped, geographically referenced complaints, assets, and work history eliminates the instances of duplicate field investigations for similar issues, saving Roads approximately 1,250 staff hours or $200,000 per year.
- **Reduction in time required for public disclosure request research** – Switching from paper records to digital data has reduced the average time to research a public disclosure request from 40 hours to 12 hours, or 70 percent. Total savings on research related to disclosure requests, claims, and lawsuits are estimated at approximately $34,000 per year.
- **General reduction in filing, tracking and recalling paper records** – Handling less paper overall has resulted in a time savings equal to approximately one full time staff position, or $70,000 per year.
- **Improved asset management practices** -Information available from the Roadworks system is also helping the division better manage assets. For example, in 2014 Roads reduced the frequency of traffic signal preventive maintenance from four times a year to once a year to cuts costs. Following that change, Roadworks data showed that incidents of signal malfunctions were increasing. Roads has used that information to increase the preventive maintenance frequency in 2016 to once every nine months, which has stabilized the asset condition while still keeping costs under control.

Work will continue, through the 2017 – 2018 biennium, to integrate additional Roads activities and underlying data into Roadworks.

4. Workforce

Strategic Focus Area:

WORKFORCE

Key Challenge: Roads' workforce is struggling with significant change

- *A more than 40% reduction in staff from peak levels in 2008 has resulted in changes in work assignments and workloads for remaining staff*
- *Morale has been affected by many years of change and uncertainty*
- *Employees want more clarity about division mission, goals, and future direction*

Staffing levels

Over the past several years, significant layoffs and organizational changes, as well as associated reductions in service, resulted from the dramatic drop in road revenues. Roads was forced to cut staff by more than 40 percent through nine layoff processes, between 2008 and 2015. This was very disruptive to productivity, morale, and effectiveness. In 2009, Roads had about 615 FTEs. In 2017, Roads proposes a base level of staffing of 363 FTEs. The decline in revenues and the resulting cuts have been unprecedented.

Labor contract seniority provisions mean that reductions in force were accompanied by "bumping" as more senior employees displaced other employees with less seniority, exacerbating the amount of organizational changes, disruption to work activities and increasing the age of its workforce which will have an impact on succession planning.

Creating stability in the workforce is essential to support productivity and effectiveness. In the 2015 - 2016 biennial budget development process, a decision was made to adjust staffing levels to a point that was sustainable, based on available revenue projections, over the 6 year planning horizon. Throughout 2015 - 2016, Roads aligned all work efforts with the division priorities identified in the adopted Strategic Plan for Road Services and the Line of Business Plan. Staff work programs were adjusted and realigned to best deploy existing resources to meet the top priorities of immediate operational safety, regulatory compliance, and a constrained amount of maintenance and preservation.

The 2015 - 2016 biennium was a period of learning what a smaller, sustainable division should look like, including service, work program, and staffing mixes. In response to the lessons learned during this period, Roads is proposing the addition of 14 FTEs and 4 TLTs in the 2017 – 2018 biennium. This represents a modest 4% increase in staffing, relative to a 14% increase in total revenues for the biennium. The additional staff resources will support work in areas such as traffic safety engineering, mandatory bridge

inspections, mandatory environmental mitigation monitoring, infrastructure asset management and implementation of Bridges and Roads Task Force recommendations.

Employee engagement

Road has embraced the results of the 2015 employee engagement survey and actively pursued the issues identified by staff. Figure 8 outlines the division's employee engagement action plans. Similar plans will be developed for 2017 and 2018 based on the results of future employee surveys.

Figure 8

Section	"One Thing"	Actions
Division Director's Office	The core management team will focus on communicating the division's mission, vision and goals to all employees in a clear, consistent, and accessible manner.	• Quarterly employee newsletter • Annual meetings with all staff work groups • Distribution of mission, vision, goals posters • Share division and section Tier Boards in visible locations to communicate strategic priorities and status
Strategic Business Operations	We will work together as a team to create a variety of professional development opportunities for all. Staff participation in developing/leading the action plan activities will be a key part of the process.	• Training plans for all individuals and work groups • Create an access guide to county career resources • Sharing training/class "reviews" (like Yelp) • Peer cross learning and skills mentoring • Opportunities for exposure to tasks or projects outside ordinary duties • Lending library/journal subscriptions/career book club • Use of Gallup strengths assessment tool • Guest speakers on career topics or county programs • Kudos bulletin board
Maintenance	Improve two-way communications with staff around strategic alignment and related issues.	• The section management team will be more visible to staff, including visiting field crews, and will be available to answer questions and share information about the state of the section, training, and other issues of importance to employees • Develop a portable Tier 2 Board (Key Performance Indicators) to share with staff and supervisors. Update and discuss monthly • Develop Tier 1 Boards for certain work groups
Engineering Services	Enhance communication and staff morale, and foster employee development.	• Increase visibility of management team at unit staff meetings, by visiting work locations, and holding regular drop in "office hours" • Creating informal gathering opportunities for team connection and communication such as coffee hour and potlucks • Utilize a communications consultant to enhance team interactions • Identify employee training objectives and report out on progress

Employee development

Training is another important component of supporting a skilled and effective staff in a smaller agency, particularly where significant job compression has occurred. Employee roles and job duties have changed and evolved rapidly since 2009. Work that was once done by several people is now the responsibility of far fewer individuals and people must be adept at multiple roles and in different areas of expertise. In addition to these changes, over the past few years many experienced staff members have retired or

voluntarily left county employment for other opportunities, decreasing the organization's knowledge base and skill sets. Consistent with these circumstances, the 2015 employee survey clearly identified training and professional growth as potential areas for improvement. Roads' previous biennial budget included a modest amount of resources for training to support both technical skill requirements and other staff development needs and the 2017 – 2018 budget will continue this training funding.

Additional workforce efforts

Several additional activities have been implemented or are underway to benefit employees, such as the following efforts:

Employee safety. Increased compliance with personal protective equipment requirements, revamped employee safety committee, improved safety trainings, and improved employee injury reporting process.

Communication. Quarterly employee newsletter has been re-introduced, annual meetings are held between senior management and all staff groups, section and work group level performance boards and other visual communication tools are being implemented to communicate alignment between strategic focus areas and work underway.

5. Focusing on safety and reacting to risk

Strategic Focus Area:

SAFETY

Key Challenge: Managing risk for hazardous and changing conditions

- *Staff resources insufficient to respond to all needs during county-wide snow and ice events*
- *Emerging high-collision locations need to be fixed*
- *Emergent hazards require prompt response*

As established in the adopted Strategic Plan for Road Services, safety is the number one priority for the management of county roads. This priority drives the agency's budget, business plan proposals and daily operations. The 2017 – 2018 proposed budget includes systematic approaches to assessing and addressing the safety of the road network, consistent with the strategic plan, and uses a risk-based strategy for determining where to allocate limited funding. The division's priorities are based upon state and Federal Highway Administration adopted American Association of State Highway and Transportation Officials (AASHTO) design standards that provide a guide for safety investments. Using standardized criteria, projects are given priority rankings, and efforts are selected and scheduled based upon these rankings and available funding. Figure 9 contains a logic model that summarizes the anticipated outcomes from safety related program and project investments for the King County road system.

Figure 9

Inputs (Resources)	Processes (What you do)	Products (# s of things you produce)	Short Term Outcomes (result or difference made)	Intermediate Outcomes	Long-Term Outcomes
We use these Inputs **44% of Roads budget** (Includes FTEs, materials, equipment, etc.)	***so that*** *we can conduct these program processes* • High collision safety program • Clear zone program • Guardrail program • School safety program • Maintenance/Operational programs	***so that*** *we can produce* • Safety countermeasures at specific locations • Obstacles removed from clear zones • New guardrail at warranted locations • Existing guardrail retrofits • Safety countermeasures near schools • Various foundational maintenance and operational activities (i.e., signs, striping, signals, etc.)	***so that*** • Hazardous situations are corrected • Clear zone is free of hazards • Guardrail is in place at warranted locations • Guardrail meets standards • School traffic safety issues have been addressed	***so that*** • Reduced crash risk at identified locations • Reduced risk of crashes with obstacles in clear zone • Reduced risk of injury/death from roadway departure crashes • Reduced risk of pedestrian or bike crashes	***so that*** **Reduced risk of injuries and fatalities on county roads**

Critical daily maintenance

Daily maintenance activities are critical to keeping roads and bridges safe for the traveling public. Foremost are efforts to address immediate life safety hazards and risks to roads assets and property. These include conditions that, if not addressed, have the potential to imminently result in injuries or death. Property damage hazards involve road conditions or defects that may result in substantial damage to road system assets and public or private property. Some examples of prevention and response include:

- removing obstructions in the traveled roadway (trees, animal carcasses, auto parts, spilled materials)
- addressing hazardous vegetation that is blocking signs and signals, visibility, pedestrian walkways or that is extending from road shoulders into traveled ways
- replacing failed road striping and markings so lanes and traffic directions are visible to drivers
- plowing or de-icing lifeline routes that serve emergency responders, hospitals and public safety facilities
- repairing significant pavement defects in heavily traveled locations including sinkholes, deep potholes, and displaced panels
- replacing damaged or missing traffic control signs (like stop signs) or repairing malfunctioning traffic signals
- repairing broken guardrails and bridge damage
- clearing blocked culverts in order to direct water away from traveled roads
- removing debris and inspecting infrastructure after a weather event such as flooding, or a natural disaster such as an earthquake

Crews and equipment are located throughout the county and perform critical safety activities 24/7, as needed, on almost 1,500 miles of roadways. When not responding to immediate life safety hazards, work is focused on asset preservation and less critical repairs.

Identifying risks and safety improvements

Identification of risks and the associated safety improvement needs is an ongoing component of the division's safety program. The county uses national guidelines like the Federal Highway Administration *Road Safety Information Analysis, A Manual for Local Rural Road Owners* to identify risks to life safety.

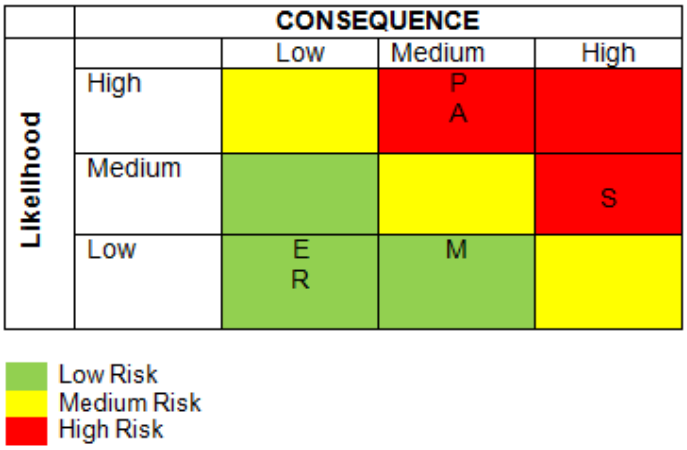
The division conducts an extensive study of multi-year county collision data as well as a review of the latest national studies on the effectiveness of different designs, materials, and traffic control measures in specific conditions and locations. The most recent county study, the 2016 High Collision Location/High Collision Rate study was finalized in August 2016**.** It identifies and analyzes statistically significant collision locations and recommends appropriate countermeasures, including associated cost estimates, for inclusion in a priority array.

County data as well as national trends indicate that roadway departure crashes (when vehicles leave the traveled roadway) pose the highest risk to human life. For example, nationally, 53 percent of fatal crashes in rural areas were caused by roadway departure crashes. Prevention of roadway departure crashes is a national priority and a focus of recent federal grant funding programs. The response to this report is a major focus of the county's 2017 – 2018 budget proposals.

Roads follows national guidance such as the FHWA *Roadway Departure Safety, A Manual for local Rural Road Owners* to develop appropriate countermeasures for roadway departure crash risks. These include activities such as guardrail construction/preservation, application of high friction pavement surface

treatments, and keeping the clear zone (at least 10 feet from the edge of the traveled roadway) free of obstacles. Risk is characterized by Roads to ensure that proposed investments address risks to life safety, property, road assets and other considerations associated with run-off-the-road collisions. Roads characterized the likelihood and consequences associated with cars that run off the roadway across six categories: life safety; asset damage; private property damage; environmental damage; mobility loss; and regulatory considerations. The proposed 2017 - 2018 Roads budget is aligned with this risk characterization (Fig 10).

Figure 10



A = **Asset damage**. Damage to public infrastructure

P = **Private property**. Damage to homes, businesses, or other private property

E = **Environmental damage** to water quality, habitat, fish

M = **Mobility loss**. Impaired vehicular, freight, non-motorized mobility

R = **Regulatory risk**. Failure to comply with NPDES, ADA and other legal mandates

S = **Life Safety**. Harm to human health

Funding strategy

Because it is not financially or logistically feasible to address all known preservation and safety-related needs simultaneously, the proposed budget includes improvements selected from scored and ranked projects in priority arrays, with the inclusion of some projects that are also eligible for federal grant opportunities in order to further stretch resources. The proposed Major Maintenance budget prioritizes adequate funding for maintenance safety programs and basic repair activities.

The High Collision Location/High Collision Rate report is based on crash data for the unincorporated road network and is reactive in nature to the changes in traffic patterns, traffic volumes and changes in driver behavior (like new issues with distracted driving). All of the identified needs/countermeasures identified in the report are funded in the proposed budget. Additionally, other standard safety programs continue, including the run-off-the-road and school zone safety programs. The run-off-the-road program identifies problem areas and implements solutions like installing new guardrail, retrofitting old and substandard guardrail, and removing or mitigating hazards in the clear zone.

Other safety program measures may include high friction surface treatments, Intelligent Traffic System solutions (traffic lights and electronic traffic management) and driver alert systems like rumble strips. Roads uses its safety studies and priority lists, based on detailed technical engineering analyses, as the basis for identifying the highest priority needs within each category.

Summary of specific safety efforts proposed within the 2017 - 18 budget

The proposed 2017 – 2018 budget will fund the following projects and programs:

- All countermeasures recommended in the High Collision Location/High Collision Rate study
- Select new and existing guardrail projects from the guardrail priority array

- An expanded run-off-the-road program using the new comprehensive inventory and ranked projects to address hazards in the clear zone
- School zone safety priorities. School zone safety has always been a priority funded within traffic safety engineering and operations programs, however, because of recent interest, it is called out separately in the budget to highlight its importance
- A modest amount of funding for roadway, bridge, and drainage preservation programs/projects (informed by the respective priority processes) to help keep county infrastructure in an acceptable condition to reduce future safety risks and allow for continued functionality of the road system
- A Quick Response program to facilitate immediate responses to unanticipated events and infrastructure failures during the biennium, such as storm damage or landslides, without having to defund and cannibalize other critical safety programs and preservation activities

Declining asset condition and increasing risk

As noted previously in this plan, critical safety work remains the top priority for 2017 – 2018. With insufficient funds for preservation or replacement of infrastructure, available revenues are focused on reacting to the higher risks associated with the deteriorating road system.

Despite the best efforts of the division to maintain the road system, the structural funding challenges will continue to negatively impact the condition of the county's roads and bridges. Failure events may be weather related (for example landslides, washouts, or flooding), or a result of necessary reductions in preventative maintenance, repairs, or replacements (for example, sink holes or pipe collapse associated with aged and deteriorated drainage assets).

The county's arterial road system will be subject to considerable deterioration over the next ten years due to insufficient revenue for pavement maintenance or reconstruction. Portions of the system may be subject to speed limitations or partial or complete closure in the future.

As outlined in the division's strategic plan, without significant increases in funding, 35 bridges are at risk of closure over the next 25 years and over 70 miles of roadway could be restricted or closed. Roads expects the pace of infrastructure deterioration to accelerate in the coming years and result in more frequent road failures and closures. As of 2016, three bridges are closed, five are height or weight restricted, and nine road segments are closed or restricted.

While it is expected that there will be an increase in road system deterioration and more frequent road failures, it is difficult to predict which specific assets will fail or when. This unpredictability poses a unique challenge for the division and means changing to a more reactive service model. To address this issue, additional funds have been allocated to respond to unanticipated failure events. In addition to flexible resources that can be used to respond to emergencies, this model requires an organizational shift and a critical focus on key skill sets. Figure 11 illustrates recent road failures**.**

Figure 11

Capital Investment - Safety

Consistent with its strategic plan, in 2017 – 2018 Roads is undertaking the following key initiatives to direct limited resources to help keep the most critical components of the road system in a state of good repair to minimize service disruptions resulting from structural degradation and safety-related road or bridge closures:

<u>High collision safety - $4 million</u>

This program will improve the safety of the roadways by making improvements which are intended to reduce the occurrence of collisions at locations or on road segments identified in the 2016 High Collision Locations and High Collision Road Segments reports (previously referred to as the High Accident Locations/High Accident Road Segments priority array). Some of the improvements include, but are not limited to, traffic control signs, pavement treatments like high friction surface treatments and pavement markings. Two mini roundabouts are also proposed for high crash intersection locations.

<u>Clear zone safety - $1 million</u>

The program identifies and removes or mitigates objects next to roadways that vehicles leaving the roadway might otherwise hit, creating clear zones. These zones create space for a driver to stop safely or regain control of a vehicle that has left the road, increasing the possibility of a safe recovery and reducing the instances and severity of crashes.

Each year, roadway departure crashes account for more than half of the fatalities. Vehicles leave the roadway for a number of reasons: to avoid collisions with another vehicle, due to mechanical issues like a blown tire, or because of weather issues like ice or fog. Driver fatigue, inattention, speeding and driving under the influence may lead to roadway departures. Providing a recovery area is important to minimize the risk when vehicles leave the road.

Roadside obstacles are defined as non-yielding or non-breakaway objects that are more than six inches high, such as trees, boulders, stumps, mailboxes, fences and utility poles. One study revealed that about 90% of the accidents occurred within 10 feet of the pavement edge, so most current road design standards call for constructing roadways with an area clear of objects for a minimum of 10 feet from the outside painted lane edge line on roads without curbing. These modern design standards were not in place for older roads. Additionally, conditions on roadsides change over time as vegetation grows or where adjacent property owners inappropriately place landscaping, fencing or other objects in the road right-of-way.

Guardrail construction - $1.4 million

This program will design and construct new guardrail systems to improve the safety of the roadways. Barriers will be installed in locations in an attempt to reduce the number and severity of “run off the road” collisions. The division has developed a priority array based on the number of collisions, average daily traffic volume and geometric design of the road.

School zone safety - $800,000

King County has a decades-long program that collaborates with school districts and local communities to improve safety in the vicinity of schools within unincorporated portions of the county. Successful school safety improvements are designed and implemented to reflect the unique characteristics and site specific conditions of each school and related traffic patterns. The county currently uses many different traffic calming measures in school zones that studies show are effective, including: beacons, radar speed signs, chokers, chicanes, lateral road shifts, rectangular rapid flashing beacons, raised crosswalks, and high-intensity activated crosswalk beacons in street pedestrian signs. Changes in school usage and traffic patterns are identified in regular meetings with school transportation officials, and engineers evaluate and design solutions to address any identified issues.

Roadway preservation - $15.8 million

During the biennium, one $7 million overlay contract is planned for 2018, and $2 million is planned for spot treatment of high-risk areas in an attempt to prolong the useful life of the road and improve safety for the traveling public. Roads that receive overlay and spot treatment will be selected based upon an assessment of their current surface and sub-surface conditions, geographic suitability, travel volume and connectivity. $6.8 million is allocated to two federally funded projects, White Center Overlay and NE Stillwater Road Reconstruction. These two projects are funded almost entirely by grant awards.

Pavement Overlay

Historically, 50+ miles were overlaid annually to preserve roads near the lowest lifecycle cost. Because of reduced revenues, the 2017 – 2018 overlay program will need to be funded primarily by grant funds. In the past two grant cycles (2013 and 2016), King County received funding to overlay eight miles of road in unincorporated King County.

Bridge priority maintenance - $1 million

This program performs high priority preservation and maintenance projects to address safety issues related to bridge deterioration, and provides for some rehabilitation and maintenance, in order to extend the life of bridges. This program is particularly critical because there are no planned bridge replacements, given current revenue restrictions. Between 1950 and 1959, there was a spike in federal funding, and 47 of the county's bridges were built or replaced. Many of the bridges built in that period have about a 50 year life span, and are reaching an age where they need to be substantially renovated or replaced. There are 16 structurally deficient and 41 functionally obsolete bridges in the current inventory. Without new funding, over a 25 year period, an estimated 35 bridges will need to be closed as they become unsafe; three have already closed.

Drainage preservation - $7 million

Water is the enemy of roadways; the drainage system in the county is aged and failing. Failed drainage can cause sinkholes and road collapse, landslides and damage to private property. There is a backlog of drainage projects and new failures are routinely identified. These repairs will address previously identified projects as well as some emergent issues, but available funds are insufficient to address more than a limited number of the top priority projects in the backlog. Work to be accomplished in this program may include new infrastructure, repairs of failing systems, ditches, shoulders or other drainage features.

Quick response - $5 million

Given the current financial situation and the accelerating rate of decline of the system condition, the division is by necessity becoming more reactive rather than proactive. The Quick Response master project will supply funds for sub-projects that arise during the year that require immediate attention. Projects can include emergency repairs associated with storm damage or other infrastructure deterioration or damage, unanticipated pedestrian or vehicle safety needs or other emerging issues. For example, portions of this rural road network run through steep terrain or along rivers that migrate. Every year, landslides and flooding damage roadways that provide critical connections between communities or that are part of sole or limited access ways. Immediate repairs are necessary to resolve closures.

Stand-alone grant projects - $13.5 million

The Old Cascade/Miller Bridge West and East project will make improvements to damaged and remaining portions of the Old Cascade Highway. In January 2011, a winter flood tore through the Skykomish Valley and changed the course of the Miller River. The flood destroyed a 100-foot section of the Old Cascade Highway, severing it into two sole access roads on both sides of the river, and left the Miller River Bridge #999W damaged and cut off from the road. In order to maintain the use of this road and to prevent possible additional damage, this project will improve the drainage and resurface a portion of the existing roadway. In addition, a turnaround on the west side of Old Cascade Highway will be constructed to provide a safer terminus, and a portion of the pavement from the river bank to the turnaround will be removed. At an estimated cost of more than $19 million, the cost of a new bridge to span the washout area is far more than what is available from federal reimbursement dollars or other revenue sources. These alternative projects, totaling five million dollars with approximately 3.25 million dollars in FEMA grant funding, seek to make the road ends safe for the traveling public.

It is anticipated that the two remaining projects, Renton Avenue Phase III Sidewalk and Highline School District Improvement, will be fully funded by grants. These projects benefit equity and social justice communities located in Skyway and White Center. The Renton Avenue sidewalk project in the amount of $3.2 million will provide for construction of a sidewalk, paved walking surface and bicycle lanes within the project area and complete some connections to recent safe routes sidewalk projects. The Highline School

District project in the amount of $5.3 million will construct sidewalks and bicycle lanes and install beacons benefiting safe routes to schools.

Ongoing maintenance and operational activities

In addition to capital project and program investments, Roads continues to dedicate significant budget resources to a wide variety of high priority maintenance and operational activities that prevent or address safety hazards and preserve the most critical infrastructure. Some key examples are highlighted below.

- **Small pavement surface repairs** such as pothole filling; square cut, skin surface and grinder patching; acute pavement surface repair; crack sealing and pouring; curb and gutter replacement and repair, and gravel roadway grading and patching.
- **General roadway maintenance** including routine, but important safety and environmental compliance work, such as sweeping and dust control to remove leaves, rocks, and debris from the roadway helping to keep it safe. Prompt cleaning also prevents dirty sediments from flowing into creeks and streams, polluting them and endangering salmon and water quality.
- **Storm response** includes snow and ice control and work associated with unanticipated damage and emergency repairs related to storm events, landslides, or washouts.
- **Traffic control device** maintenance for: signals, flashers, street lighting, and all associated components such as controllers, lights, mast arms, timers, cameras, cabinets, and loop detectors.
- **Signs** including replacement and installation, fabrication, inspection, cleaning, and responding to constituent service requests.
- **Pavement marking maintenance** including replacement of pavement markings such as striping, thermoplastic, and buttons.
- **Intelligent transportation system equipment**, which promotes safety and efficiency, and can enhance transit speed and reliability by enabling the orderly movement of all road users on streets and highways. This equipment also provides real-time traffic information to King County traffic operators, the media, and the traveling public.

Regular maintenance of traffic control devices ensures that:

• Damaged signs are replaced;

• Traffic signs, stripes, and markings are replaced so that they are visible night and day;

• Intersections are operating efficiently;

• Traffic control systems are operating correctly;

• Traffic information is accurate, clear, and appropriate; and

• Traffic restrictions are clearly marked.

- **Vegetation management** includes mowing and maintaining trees, brush, and natural areas on the roadside to provide clear sightlines for drivers, improve drainage, and to keep traffic control signs, wayfinding signs, and traffic signals from being obscured. Overgrown vegetation on sidewalks, shoulders, and other walkways can lead to pedestrians walking in the roadway, and dangerous or downed trees can block roadways. Noxious weed control and shoulder/roadside spraying is also employed.
- **Shoulder cleaning and restoration** involves the maintenance of gravel shoulders, including gravel patching, grading and restoration; and landscape maintenance. Maintaining shoulders prevents standing water that is a risk to drivers and reduces deterioration of the roadway.
- **Minor roadside features maintenance**, includes repair or replacement of rock walls, retaining walls and fences, and removal of hazardous material and roadside debris.

- **Drainage system** cleaning involves includes pipe and catch basin cleaning, and vactoring of sediment.
- **Ditch maintenance** includes cleaning roadside ditches to ensure proper drainage.
- **Drainage minor repair for pipes**, catch basins, and other associated infrastructure.
- **Stormwater pond maintenance** such as mowing, brush removal, and cleaning to preserve water quality and capacity to retain flows and prevent minor flooding.
- **Minor bridge maintenance** such as small repairs, debris removal, surface cleaning, and graffiti removal.
- **Routine inspections**, load ratings and other analyses inform the need for the minor (as well as major) maintenance and repair of structures.

6. Water

Introduction

Managing polluted stormwater runoff poses a major challenge for King County government and jurisdictions throughout the Puget Sound basin. Polluted stormwater degrades water quality and adversely impacts ecosystems. Pollution in stormwater constitutes the greatest threat to the long-term health of Puget Sound. The causes of pollution are varied and rooted in individual behavior, past practices and policies toward land use, economic development, and transportation, making it complicated to address.

Strategic Focus Area:
WATER AND DRAINAGE

Key Challenge: Water is the "Enemy" of Roads

- *Water that is not managed can damage or destroy roads.*
- *Some roads are located in vulnerable, chronically flooded locations.*
- *A shifting climate is projected to increase major river flooding and surface water impacts to the roads system.*

Development in the county occurred without systematic stormwater flow control or treatment facilities. Most of the conveyance system that does exist runs under the road network, and unmanaged stormwater on roadways not only impairs water quality, but also damages road infrastructure and impacts mobility. The cumulative effect of development, without adequate stormwater management, is the gradual degradation of water quality in creeks, rivers, lakes and Puget Sound. King County has numerous creeks, rivers, and lakes that have been identified by the Washington State Department of Ecology (Ecology) as impaired water bodies, in many cases due to the impacts of polluted stormwater.

King County must comply with its' National Pollutant Discharge Elimination System (NPDES) permit requirements established by Ecology to comply with the federal Clean Water Act. Additionally, the county has a Surface Water Management (SWM) utilities and fees to fund programs to reduce flooding, maintain stormwater infrastructure, and address stormwater related water quality impairments. This jurisdiction-by-jurisdiction regulatory structure results in a poorly coordinated approach to managing stormwater and improving water quality. Additionally, recent studies illustrate that the cost of addressing stormwater runoff in King County, and more broadly in the Puget Sound region, far exceed the funds available from existing SWM fees and other funding sources. In particular, the County Road Fund, the primary funding source for drainage within unincorporated King County, is significantly underfunded to adequately maintain the infrastructure of the road network. Given inadequate resources, the county and cities across the Puget Sound basin will need to find ways to better coordinate and plan programs, and explore new and innovative funding sources and approaches to managing stormwater.

King County surface water management fee

In 1986, the King County Council adopted the original surface water management (SWM) fee and rate structure, which assessed fees on all developed and cleared properties in urban unincorporated King County. In 1999 the area covered by SWM fees and services was expanded to include all of unincorporated King County. The fee has been raised several times since then, the most recent being in 2012.

The SWM fee is assessed on the amount of impervious surface on a parcel and it appears on a resident's property tax statement. SWM funds have been used for some drainage projects in the county road right-of-way and for a study to inventory the drainage assets in the right-of-way that are 24 inches or greater in size. The SWM fee is being considered as a source of future funding to address some drainage asset needs in the right-of-way.

Challenges to the comprehensive management of water and roads

Lack of coordination

With respect to stormwater management in Washington State, the Department of Ecology administers the Clean Water Act for the EPA, issues NPDES permits to all of the Phase I and II permitees, and plays a large role in determining how permitees regulate stormwater. Under the Clean Water Act and the state NPDES program, each jurisdiction has both a set of permit requirements and a Surface Water Management (SWM) fee for use within the jurisdiction. This makes coordinating across jurisdictions on stormwater and water quality very challenging.

Each NPDES permit holder is responsible for managing stormwater within their jurisdiction, and jurisdictional authority is bounded by political boundaries, not watershed lines. This limits comprehensive funding and planning of stormwater management. Increasingly, the Department of Ecology is pushing jurisdictions, through the NPDES permitting process, to plan and act regionally.

Inadequate funding

The existing annual funding generated by King County jurisdictions' SWM fees, and the limited funding that comes from the state and federal government in grants, is inadequate for managing stormwater and related infrastructure. In order to retrofit all stormwater infrastructure in unincorporated King County, the capital cost is approximately $1.2 Billion in **2013** dollars. To address this need over 100 years would translate into an annual expenditure of approximately $60 million to $100 million in capital spending. Currently the capital budget for King County Roads drainage preservation program is approximately $3.5 million per year – and those funds are entirely dedicated to addressing failing facilities rather than retrofitting or replacing facilities before they fail.

Working across King County

Within King County government, all agencies are responsible for the management of stormwater on their assets. Historically, each agency has managed stormwater independently with overall regulatory responsibility held in the Water and Land Resources Division (WLRD). With the growing financial challenges facing King County Roads, the division will not be able to adequately maintain stormwater conveyance infrastructure in the road right-of-way, causing potential threats to mobility, public safety, and water quality. In recent years, the two divisions (WLRD and Roads) began working together to identify efforts that would address their respective priorities:

- Protect public safety
- Maintain existing infrastructure
- Support primary mission: water quality (WLR) / mobility (Roads)
- Protect private infrastructure

In the development of the 2017 - 2018 proposed budget, the two divisions have been partnering to identify ways to improve effectiveness and drive efficiencies by working more closely together and leveraging each division's respective expertise. Both divisions have developed a single drainage asset inventory database, been developing asset management frameworks, learning from and advancing each other's efforts and growing knowledge base. WLRD coordinated a joint agency project to inventory the most critical drainage assets in the right-of-way, pipes and systems that are 24 inches or greater in size. WLRD will continue mapping drainage assets in the right-of-way to gather information required as part of their regulatory responsibilities, but will also collect condition information.

Roads uses a geographically based asset management information system. WLRD will be investing in the same system in the future using common standards and procedures for data collection and management. Roads has expertise in project delivery, including contract management and permitting. Given that expertise, drainage capital projects will be managed, to the extent feasible, by Roads. For similar reasons, Roads will perform most maintenance activities on drainage assets. The divisions will jointly develop capital project priorities to identify projects that maximize efficiencies across stormwater, flood hazard reduction, and road assets. These project investments will have multiple benefits including better regional mobility, asset management, water quality, surface water management and environmental outcomes than would otherwise be possible.

Executive priorities

This collaborative work across divisions supports organization goals as well executive priorities. Working more efficiently and effectively helps to achieve goals related to both mobility and environmental sustainability.

7. Facilities

Strategic Focus Area:
MAINTENANCE FACILITIES

Key Challenge: Maintenance facilities do not support efficient service delivery

- *Some facilities are in the wrong location and some service districts lack necessary facilities such as material storage.*
- *Some facilities are outdated, under-sized, deteriorated and do not support contemporary approaches to maintenance work and environmental compliance.*
- *Some sites lack adequate facilities to support staff needs for restrooms, heat, changing areas, etc.*

The division evaluated its maintenance facilities as part of its 2015 strategic plan update. An outcome of this evaluation was the identified need to deliver maintenance services more efficiently, identified needed repairs and guided the process of facility consolidation. Travel time is a significant factor in service delivery, and therefore, having facilities centrally located is an important efficiency and safety strategy. Some maintenance facilities have been surrounded by urban growth, and with the change in service areas, no longer allow for efficient and time sensitive service delivery. Dense urban areas in the western part of the county have annexed into cities, and as a result, the county's service area has moved farther to the east. In 2014, Roads consolidated facilities and redrew maintenance district boundaries. Roads moved out of three facilities and staff were consolidated in the remaining six facilities.

As part of the facilities evaluation process, a consultant identified critical maintenance facility repair needs. Roads is currently implementing several key recommendations, including the replacement of failing roofs, siding, windows, HVAC systems, and minor repairs to a number of facilities. It is necessary to have facilities with adequate heat to keep equipment from freezing, and weather-tight to keep equipment and supplies from suffering rain damage. These facilities need adequate systems to ensure there is power so that staff are safe and can get warm. Road crews are public safety first responders, working as needed 24/7 to respond to road condition issues or collisions, and operating 24 hour shifts during serious flooding, snow, ice and wind or other emergency events. Figure 12 illustrates current degraded conditions at some maintenance facilities.

Roads is also constructing nine covered sand and salt storage facilities throughout the service area to support snow and ice control services. Without appropriate covered facilities, the sand used in responding

to snow and ice will freeze in trucks, resulting in significant delay of road treatment necessary to make roads passable.

In addition, a consultant is currently evaluating siting alternatives for replacement facilities in northeast King County and on Vashon Island. The current Cadman maintenance shop in Redmond is located in the the wrong location for current and future needs, and since it is within the city boundaries, is likely to be rezoned for denser development soon. The Vashon shop is very old and significantly undersized and the facilities are failing.

The county is developing a partnership with WSDOT to co-locate at the state's maintenance facility in Preston. This will support Roads objective of moving its Fall City maintenance shop, which is at risk to major river flooding, is close to one hundred years old, and is undersized. Roads will be installing an office trailer, heated vehicle storage bays, and a covered sand/salt storage facility on the site. Roads is planning to relocate its Fall City maintenance operations to Preston in 2017.

All of the activities above were funded through Roads 2015 – 2020 capital improvement program and are in the process of implementation. No additional facilities funding is requested for these projects in the 2017 – 2018 proposed budget.

The 2017 – 2018 budget proposal contains one new request related to facilities – to fund a site master plan for the Roads' maintenance headquarters campus located in Renton. This campus also houses several other county agency users. The City of Renton is requiring a master plan before permitting further improvements that are needed by Roads and its tenant agencies at the complex.

Figure 12

Vashon: exposed salt storage

Fall City: degraded and leaky salt shed rood roof does not protect equipment and materials stored inside

8. Climate change

The 2015 King County Strategic Climate Action Plan (SCAP) provides guidance for how the region will achieve an equitable, sustainable, and clean energy future.

Future shifts in climate are anticipated to increase the volume of water as well as flooding intensities, within King County's waterways and system of stormwater pipes, culverts, ditches and other drainage assets. King County's road right-of-ways contain drainage assets and facilities that Roads maintains to limit the damaging effects of water to roadways. When drainage assets need replacement, Roads installs larger sized culverts and pipes to accommodate future anticipated increases in storm flow. Ancillary habitat benefits of these larger sized conveyances may include improved fish passage, and in some cases, the upsized wildlife movement corridors under the roadways during dry seasons. Projects incorporate native plants and bio-swales which improve water infiltration and water quality. When feasible, projects are also designed to increase overall tree cover and habitat complexity within the project area.

Roads drainage preservation projects are aligned with three SCAP Goal Areas: Goal Area 3 (Green Building); Goal Area 4 (Consumption and Materials Management); and Goal Area 5 (Forest and Agriculture). Key drainage preservation projects are reviewed to identify opportunities to achieve sustainable infrastructure score card requirements for energy, greenhouse gas emissions, storm water management, and construction/demolition materials diversion. Coordinated waste reduction strategies may result in reuse of materials on site when possible, salvaging of materials offsite, disposal of hazardous waste (if applicable), and recycling. Fleet and fuel efficiencies may be gained through judicious project management, logistics, and reduction in travel times.

Roads has a long history of incorporating principles of sustainability into its delivery of capital projects and programs. Capital projects are reviewed to identify opportunities to achieve sustainable infrastructure score card requirements for energy, GHG emissions, stormwater management, materials selection, and construction/demolition materials diversion. Coordinated waste reduction strategies result in re-use of materials on site when possible, salvaging of materials offsite, disposal of hazardous waste (if applicable), and recycling. For example, generated vactor solids and road sweepings are used as daily cover at the Cedar Hills landfill and recycled road concrete for the Dockton seawall on Vashon Maury Island.

Currently, all of Roads capital projects benefit from a check-in early in the project delivery cycle to identify opportunities to improve efficiencies, enhance sustainability, and ensure alignment with the Strategic Climate Action Plan. Roads contributed significantly to the preparation of King County's Green Operations and Maintenance Handbook. Maintenance and operations staff are encouraged to consider logistics, materials choices, and reduction in travel times. Tools and equipment are thoughtfully replaced and recycled, when appropriate. Though safety is the primary driver for all of Roads activities, individual capital projects and county-wide programs are aligned with many SCAP targets and goals.

SCAP goal areas that are advanced through Roads projects and programs, both in their outcomes and the manner in which they are delivered, include:

> **SCAP Goal Area 1 Transportation and Land Use.** Examples include sidewalk projects that fill a missing link in the overall sidewalk network of an urban area in order to increase opportunities for nonmotorized travel.

SCAP Goal Area 2 Buildings and Facilities Energy. Examples include upgrades and relocations to maintenance facilities that reduce energy consumption and recently completed LED conversion projects.

SCAP Goal Area 3 Green Building. All of Roads capital projects are reviewed early in the design process to maximize project efficiencies and sustainability outcomes. Roads is well on its way to achieving 100% platinum for its capital projects by 2020, per the Sustainable Infrastructure Score Cards. Roads approach to managing its construction and demolition materials is one example of sustainable strategies in place. Maintenance facility projects employ energy efficient technologies.

SCAP Goal 4 Consumption and Materials Management. Roads employs a coordinated approach to waste reduction and actively seeks project and program opportunities to reduce, reuse and recycle materials.

SCAP Goal 5 Forests and Agriculture. Roads drainage projects result in improved water quality, habitat and tree canopy conditions. The primary goal of these projects is to increase the volume of flows, often through installation of larger sized culverts and pipe. Moving higher volumes of water through enhanced drainage infrastructure protects the roadway assets from the damaging effects of water. Greater levels of coordination with King County Water and Land Resources often results in projects that have greater positive impacts to road condition, water quality, and habitat/tree canopy cover. Lastly, some Roads drainage projects required large sized culverts that also serve as wildlife crossings, under roadways, reducing the conflict between animals and vehicles creating safer roadways. Safety crossings improve the resilience of natural systems in the face of shifting climates and a 2016 National Academy of Sciences study found that safe passages across roadways are an effective preparation for climate change impacts, per Section 2 of the SCAP, Preparing for Climate Change.

9. Equity and Social Justice

Roads integrates equity and social justice (ESJ) principles into agency business operations and budgeting in the following ways:

- **Prioritize emergency snow and ice response along Metro's highest priority transit snow routes**, since these may be the only source of transportation available to lower-income residents. Roads has had to scale back snow and ice response for budget reasons, but these routes remain a priority. An agreement with the City of Seattle under which they plow certain city boundary roads and critical routes between cities also helps sustain service in ESJ communities.

- **Promote equal access to, and availability of, information and services** for all county residents by designing division communications and public engagement processes that are culturally relevant for diverse communities, including communities whose residents have limited English proficiency.

- **Utilize partnerships with other King County or external agencies, community groups, and non-profit organizations** to better understand community needs and obtain community input and involvement.

- **As funding or grant opportunities permit, provide road-related capital improvements** that serve the needs of communities whose residents are low-income, racially/ethnically diverse, or have limited English proficiency. Non-motorized improvements are emphasized in particular because they both help to support active, healthy lifestyles and also facilitate mobility for people with disabilities, those who cannot drive or unable to afford a car. Roads proposed 2017-2018 CIP includes two grant-funded projects:

    - Construct missing links of sidewalk on Renton Avenue South between 68th Avenue South northward to South 112th Street, a community with significant low income, limited English speaking, and racially diverse populations.

    - Plan and construct sidewalk, intersection, and school zone safety improvements in the White Center area, which is also a community with significant low income, limited English speaking, and racially diverse populations.

- **Evaluate division projects and programs using census data and other relevant demographic and community data.** A primary ESJ information source used by Roads to inform business and budgeting decisions is the King County's Equity and Social Justice Area Map that is contained within the 2016 King County Comprehensive Plan. This countywide map was created by the King County Executive's Equity and Social Justice Committee and reflects data from the 2010 Census and 2006 - 2010 Five Year American Community Survey. ESJ areas identified on the 2016 maps are portions of the county where there are higher percentages of residents that meet one or more of the following criteria: low income, have low English proficiency, and/or people of color. The urban North Highline and Skyway-West Hill potential annexation areas are significant ESJ areas. However, the rural areas outside of the Urban Growth Boundary do not have significant concentrations of ESJ populations.

- **Improve internal processes to encourage diversity and expand opportunity.** Roads strives to attract larger applicant pools and ultimately a diverse and competitive work force. The job

recruitment and application process was simplified for trades and crafts openings. Job announcements only contain necessary minimum qualifications to lessen the likelihood of presenting artificial barriers for otherwise qualified candidates. Job postings include the following statement to create a culture that actively seeks to increase diversity in the workforce: “King County values diverse perspectives and life experiences. The Department of Transportation encourages people of all backgrounds to apply, including people of color, immigrants, refugees, women, LGBTQ, people with disabilities, and veterans.”

Roads has participated in the Department of Community and Human Services’ summer intern program and continues its commitment to provide opportunities for underprivileged youth to have access to professional working environments and career paths.

- **Provide ESJ training opportunities.** All Roads staff is provided with basic ESJ training to promote a culture that understands and values diversity in the workplace.

During 2017 - 2018, Roads will seek to further understand ESJ issues in its service area. The division will revisit data as it becomes available to determine whether ESJ populations are moving into the rural area, recognizing that within 20 years, Washington will become a majority-minority state and King County is expected to experience significant demographical change.

10. Services provided to cities

Over the past two years, Roads has limited its commitments to provide engineering, project management, and general maintenance work for cities and other agencies in order to fully focus the agency on keeping county roads and bridges as safe and functional as possible. As discussed in the 2015 – 2016 Line of Business Plan, funding challenges significantly reduced the ability of Roads to act as “consultants” and “contractors” for cities and other agencies.

Roads currently provides cities with more technically complex services like bridge inspection, materials testing, and traffic signal maintenance. This type of work is appropriate for a regional public provider because most other small agencies cannot support specialized staff for occasional projects. This work can be scheduled around county needs, and these are services that are typically less available in the private sector. Roads avoids work for other agencies that presents a seasonal conflict with work necessary on county roads, like sweeping for leaves, and will continue as a regional provider for work that is less time sensitive and allows for economies of scale, like expert bridge inspectors.

A continuous improvement project (Lean) is underway in 2016 to improve the efficiency associated with city services including: service request submittals, approvals, completion of work, communication with city customers, record keeping and billing. This process framework will result in more efficient, predictable and streamlined service provision for both customers and county staff.

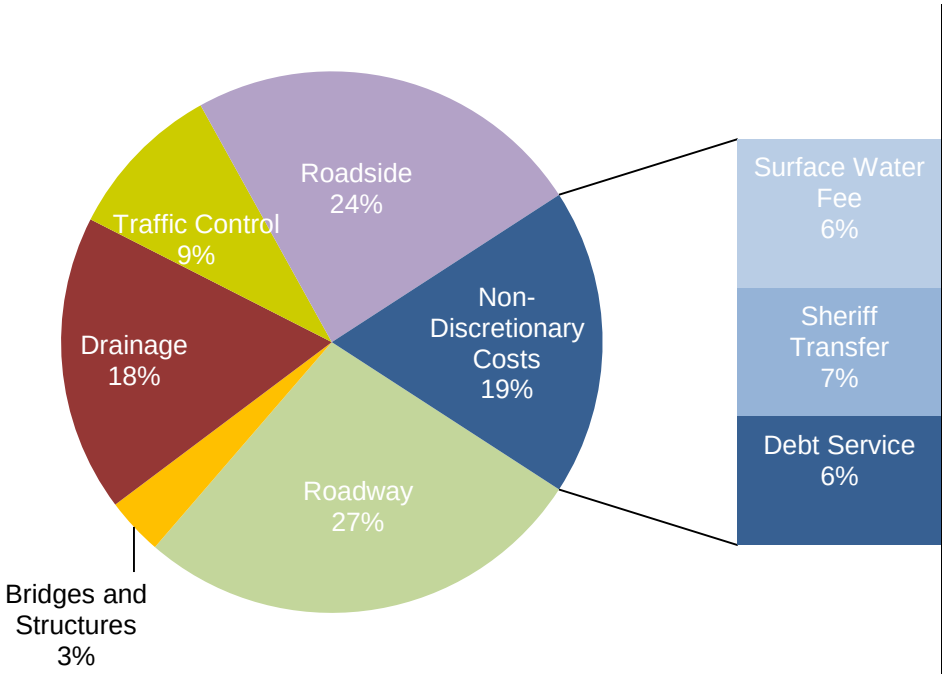
11. Product Catalog

This section outlines the products delivered by the Road Services Division (Roads) to its customers in 2017-2018. It aligns product families with proposed budget investments, explains what is being purchased and why, and highlights some anticipated results of those investments.

The division's Roadworks asset management system has begun producing data on productivity units and other metrics. This data will become more comprehensive over the next several years as work order and asset condition history accumulate in the system. This plan shares the planned data representations; some metrics are based on actual data and some are based on proxy indicators. The graphics below are intended for illustration purposes. This plan also establishes a framework for these metrics and graphs, and as data accumulates they will become increasingly accurate. The plan also shares what the current investments will result in.

2017-2018 Budget by Product Family and Other Costs

Total = $210 million



PRODUCT FAMILY:

Roadway

What is it?

The roadway product family includes:

- Roadway surface – the drivable surface, which is primary made of asphalt, gravel, concrete, or brick.
- Roadway substructure – several differing layers of gravel, dirt, and other materials, to support the roadway surface. Many of the county's older roads were built upon wood and rock, rather than being engineered with modern materials.

Strategic Plan for Road Services priorities for the roadway network:

1. lifeline routes
2. arterial roads
3. sole-access local roads
4. other local access roads

Desired attributes

- Meets safety and environmental standards
- Free of hazards
- Accessible for emergency vehicles
- Usable during snow events
- Smooth ride
- No load limits or undue speed restrictions
- All lanes open
- Reliable travel time
- Free of litter/debris

By the numbers

- **Nearly 1,500 miles** (more than the distance from Canada to Mexico). Roughly one-third are arterials.
- **Over 1 million trips per day** (on some high-volume roads, half of the trips originate in cities or other counties).
- **Up to 70% of arterial miles (or 315 miles)** need some level of rehabilitation or reconstruction beyond basic pavement surface treatments.

Purpose and relationship to network

The roadway enables movement of people and goods, serving residents, commerce, emergency services, and other users. Cars, trucks, buses and bicycles all use the roadway for their travel needs. Traffic volume and vehicle weight, especially heavy trucks and buses, plus water and weather all impact the rate of deterioration of the roadway asset.

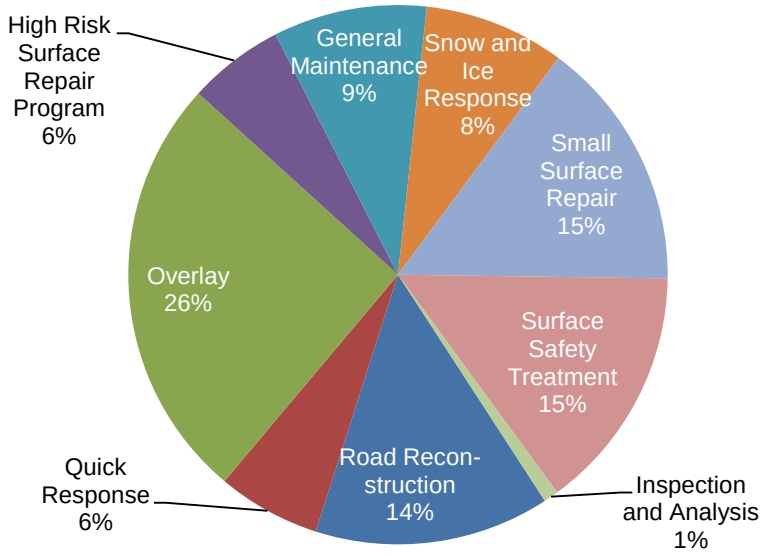
Road pavement protects the roadbed below from deterioration. Pavement must eventually be resurfaced due to wear and tear or the subsurface will deteriorate at an accelerated rate.

The roadbed or subsurface is critical to the structural integrity of the road. If the roadbed is deteriorated, no amount of repaving will keep the surface smooth. The area under and adjacent to the road may serve as a pathway for utilities, enabling an efficient and consolidated use of a pre-existing network that minimizes impacts on private property.

PRODUCT FAMILY: **Roadway**

Proposed 2017-2018 investment - $56 million

Operating and capital activities



Description

Small surface repairs**:** Activities such as pothole filling, square cut patching, and crack sealing. More of these activities will be performed as a means of addressing critical safety issues, particularly in light of inadequate investment in overlay and reconstruction.

High-risk surface repair program**:** Repair of localized defects in the road surface and/or subgrade. With an increasing number of potholes and surface cracks and a reduced overlay program, this program provides a stop gap solution until the road can be placed in the overlay program. Activities include:

- Repairing the poorly compacted road subgrade,
- Repair wheel well ruts,
- Repair large alligator and cracked areas,
- Short length - full width overlays where an overlay contract would not be economically feasible

Overlay**:** Funds (including $1.9 million in anticipated grant revenues) to resurface approximately 35 miles in the biennium. Includes both chip seal and asphalt overlay.

Road reconstruction**:** Reconstruct 1.59 miles of NE Stillwater Hill Road from State Route 203 to NE Big Block Road in northeastern King County, between the cities of Carnation and Duvall. This project will excavate and restore the roadway sub-base, rebuild the road, including the shoulders, with drainage, overlay and striping.

PRODUCT FAMILY: **Roadway**

General roadway maintenance**:** Routine, but important maintenance tasks such as sweeping, curb and gutter repair, and hazard removal. These tasks are done for safety and environmental compliance.

Snow and ice response**:** Staffing, equipment and materials required to deal with snow and ice events. The primary capacity constraint for snow and ice response during a countywide event is the number of licensed and trained truck/plow drivers. The county employs year-round licensed and trained teams who are experienced at operating snow and ice equipment, and who also provide support for maintaining and preserving roads and bridges throughout the rest of the year. There are ongoing efforts being made by the county to identify on-call drivers, however, because in this region severe winter weather is infrequent, there are a limited number of licensed, trained, and available operators for work that is highly episodic and short-term. Funding staffing levels sufficient to care for the year round maintenance needs of county roads and bridges is the best way to ensure staff is available to keep critical parts of the roadway network open during large county-wide snow and ice events.

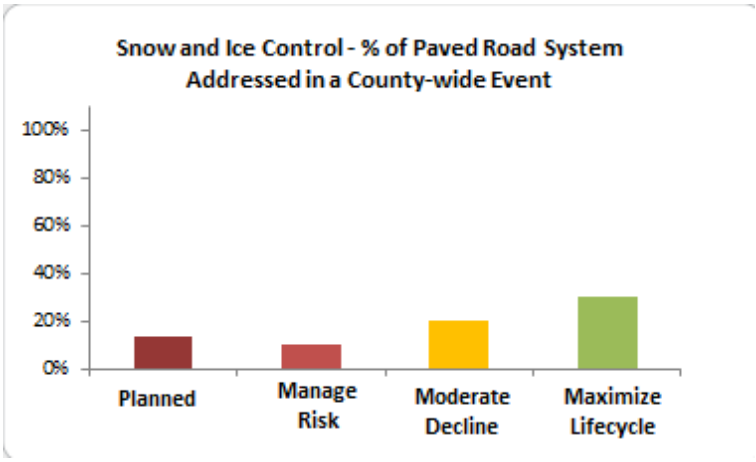
Inspection and analysis**:** Activities to support pavement condition rating, analysis and reporting. The state's County Road Administration Board requires that the county rate and report on pavement condition in order for to the county to receive state gas tax revenues. In addition, road conditions are reported in King County's Comprehensive Annual Financial Report as required under Government Accounting Standards Board Statement 34.

Quick response**:** Funds for unanticipated damage and emergency repairs related to storm events, landslides, or severe roadway condition deterioration.

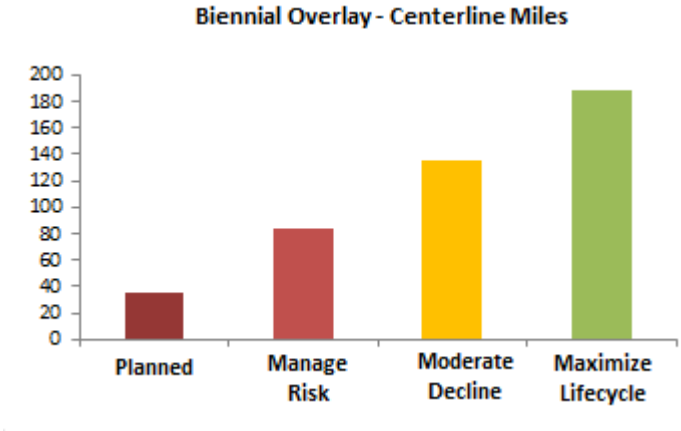
Surface Safety Treatment: The application of a surface treatment to the pavement to enhance the skid resistance of the pavement surface. Adding this surface treatment helps to keep vehicles in their lanes when they are subject to lateral and centrifugal forces. This treatment is intended to reduce the occurrence of collisions and will be applied along roadway segments identified in the division's 2016 High Collision Location Report.

PRODUCT FAMILY: **Roadway**

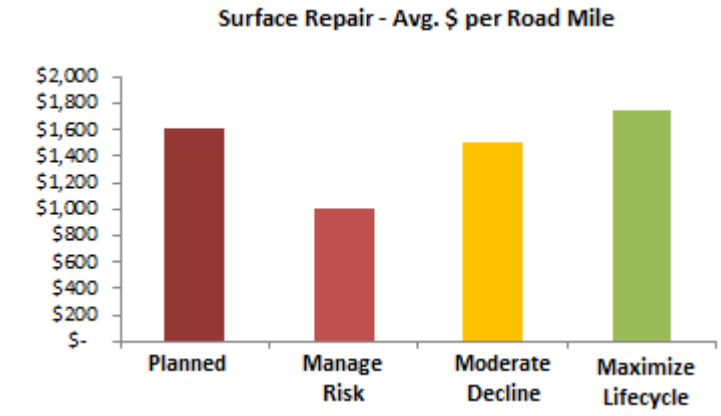
Selected 2017-2018 planned accomplishment levels



Given the current staffing levels, an estimated 14% of the system can be plowed in a county-wide storm event. In 2012, the county could treat 30% of the system – typical of what most transportation agencies strive to achieve to keep critical life safety and travel routes open.



Historically, 50+ miles were overlaid annually to preserve roads near the lowest lifecycle cost. Approximately 35 miles will be overlaid in the biennium, including both chip seal and asphalt overlay. The 2017 – 2018 overlay program is partially supported by grant funds.



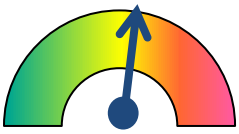
To preserve the roadway for as long as possible without adequate funding for overlay, an expanded surface treatment program (square cut and pothole patching, grinding, etc.) will be continued. This program will also address critical safety issues related to pavement conditions by identifying and making repairs to roadway segments.

PRODUCT FAMILY: **Roadway**

Expected results of 2017-2018 investment - customer experience

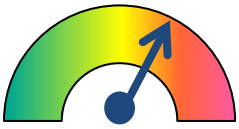
Desired attribute: All lanes open
Indicator: Road closures and/or restrictions

- Significant
- Moderate
- Minor



Desired attribute: Smooth ride
Indicator: Percent of road miles with good* or better pavement condition score

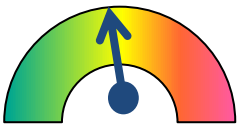
- 0 – 49%
- 50 – 79%
- 80 – 100%



*Pavement condition score of 50 (out of 100)

Desired attribute: Free of hazards
Indicator: Average time (in hours) to respond to a hazard

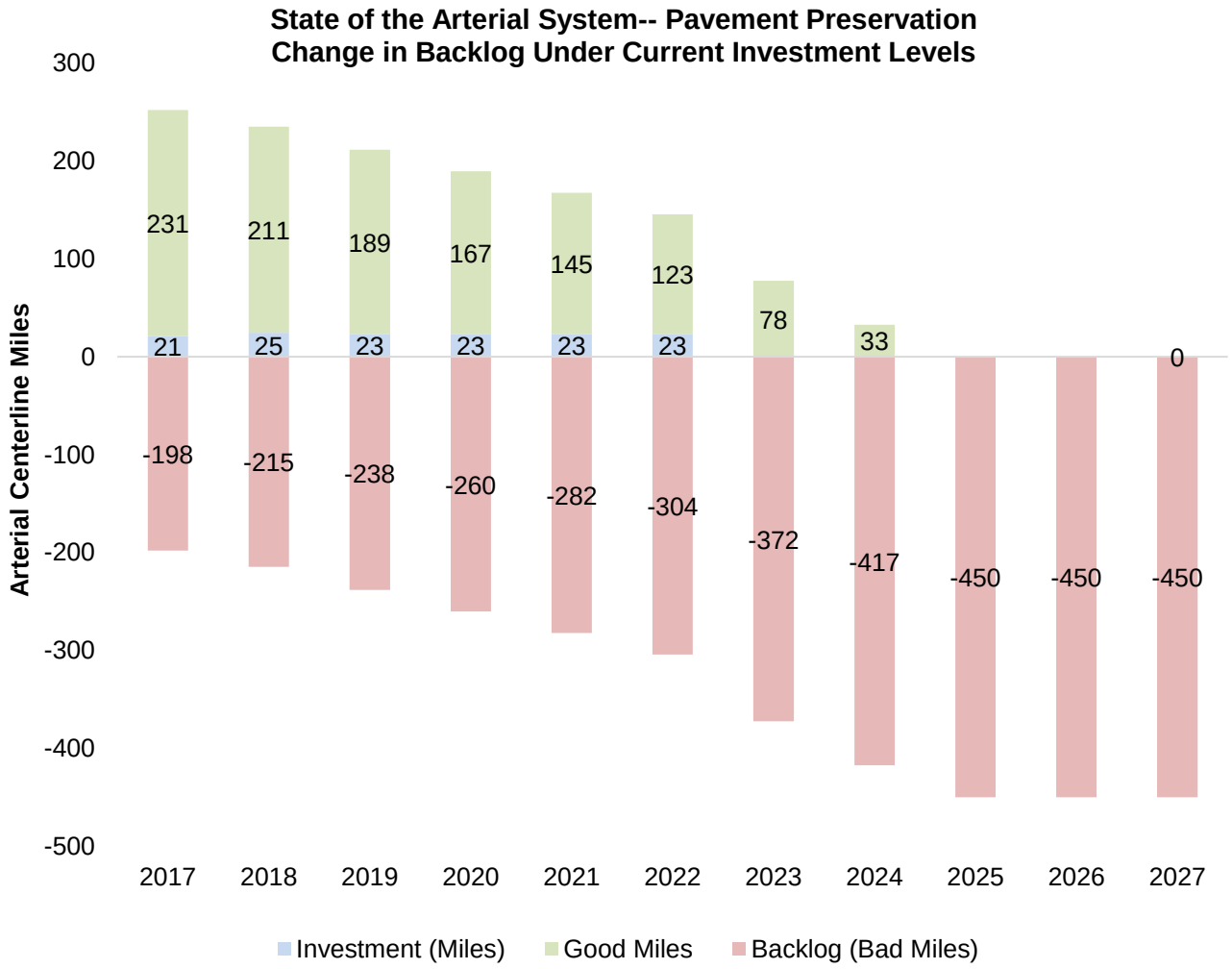
- Over 25 hours
- 13 – 24 hours
- 0 – 12 hours



PRODUCT FAMILY: **Roadway**

Backlog/forecasting analysis

The arterial road system will continue to be subject to considerable deterioration over the next ten years due to an ongoing projected lack of resources to invest in maintenance, preservation, or reconstruction. Portions of the system may be subject to speed limitations or partial/full closure in the future.



PRODUCT FAMILY:

Bridges and Structures

What is it?

The bridges and structures product family includes:

1. Bridges – can be made of concrete, steel, or timber and include long span bridges, short span bridges, safety enhancement bridges that help keep wildlife off roadways, and pedestrian bridges.
2. Structures – infrastructure designed to retain or contain the natural environment and protect the built environment. Examples include seawalls and retaining walls.

Desired attributes

- Meets safety and environmental standards
- Free of hazards
- Open
- No load/height restrictions
- Non-motorized access
- Minimal crossing delays
- Free of litter, debris, graffiti, bird guano

By the numbers

- **181 bridges** owned and maintained by King County

Road Services also inspects an additional:

- 161 city-owned bridges
- 10 King County Parks bridges

Oldest bridge: Deep Creek Bridge, built in 1912

Newest King County bridge: South Park Bridge, opened June 2014

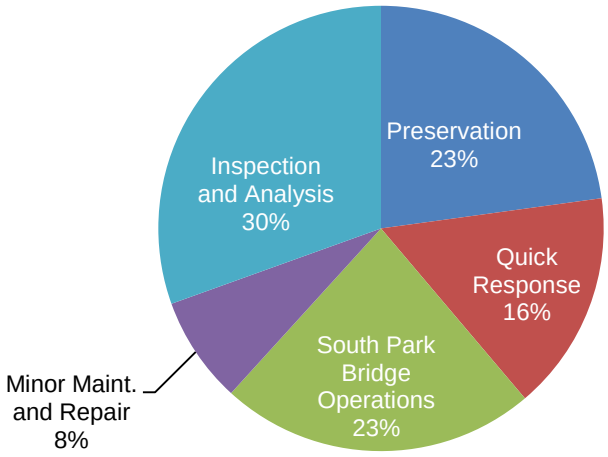
Purpose and relationship to network

Bridges are key components of the county road network that provide routes over bodies of water, roads, lowlands, railroad tracks or other obstacles. Bridges are inspected regularly and if found to be unsafe must be fixed or closed. Closures can result in loss of access to property or longer travel times due to detours.

Structures enable roads to exist in diverse landscapes by controlling and shaping the natural environment and providing protection from environmental impacts such as flooding, tides, waves, storm surges or landslides.

PRODUCT FAMILY: **Bridges/Structures**

Proposed 2017-2018 investment - $7 million
Operating and capital activities



Description

Preservation: Bridge needs identified through the inspection process. The needs can range from minor repairs to full replacements.

South Park Bridge operations: Operating costs for the South Park Bridge, which requires bridge tender staff to raise and lower the bridge for boat traffic.

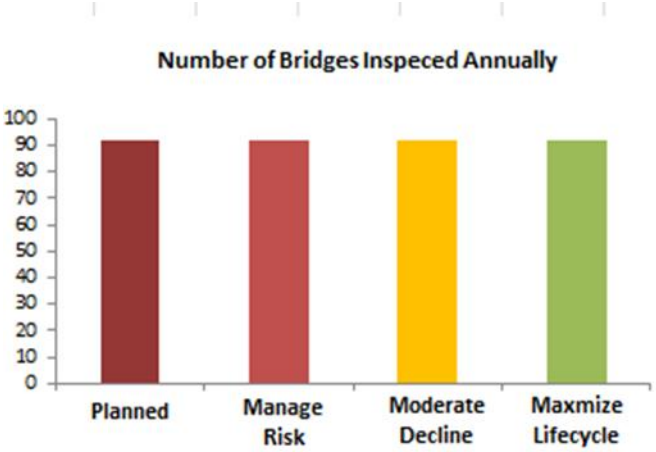
Quick response**:** Funds to address unexpected failures associated with the bridge system.

Minor maintenance and repair: Tasks associated with routine bridge maintenance and repair, including small repairs, debris removal, surface cleaning, and graffiti removal.

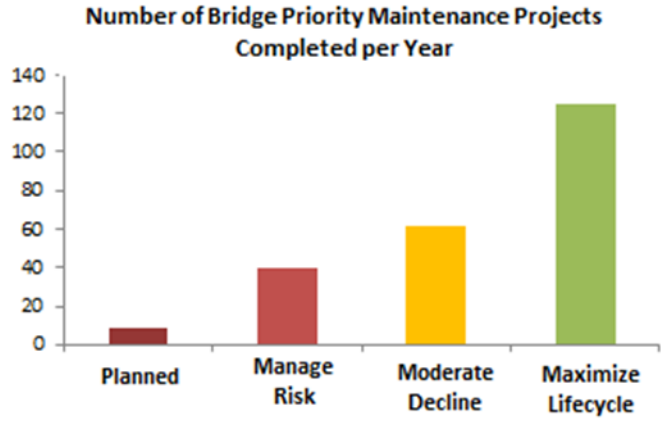
Inspection and analysis: Tasks associated with performing bridge inspections, load ratings and other analyses.

PRODUCT FAMILY: **Bridges/Structures**

Selected 2017-2018 planned accomplishment levels



There are 181 bridges in the King County inventory. The federal government requires that all bridges be inspected every other year, more often if the bridge condition warrants or if emergency events such as flooding or earthquakes occur. The division will be meeting those requirements in 2017 - 2018.



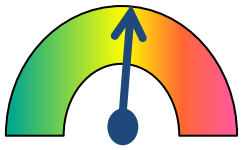
Bridge inspections result in a prioritized list of maintenance and preservation needs. Because of budget constraints, many issues that do not pose immediate safety risks will not be addressed in the biennium.

PRODUCT FAMILY: **Bridges/Structures**

Expected results of 2017-2018 investment – customer experience

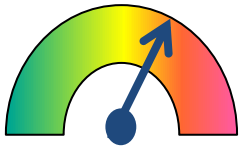
Desired attribute: Bridges open
Indicator: Number of bridges closed indefinitely or permanently

- Increasing
- Stable
- Decreasing



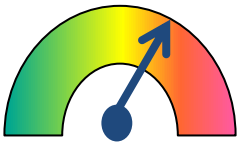
Desired attribute: No restrictions
Indicator: Number of bridges with load restrictions

- Increasing
- Stable
- Decreasing



Desired attribute: Good structural condition
Indicator: Number of bridges structurally deficient*

- Increasing
- Stable
- Decreasing

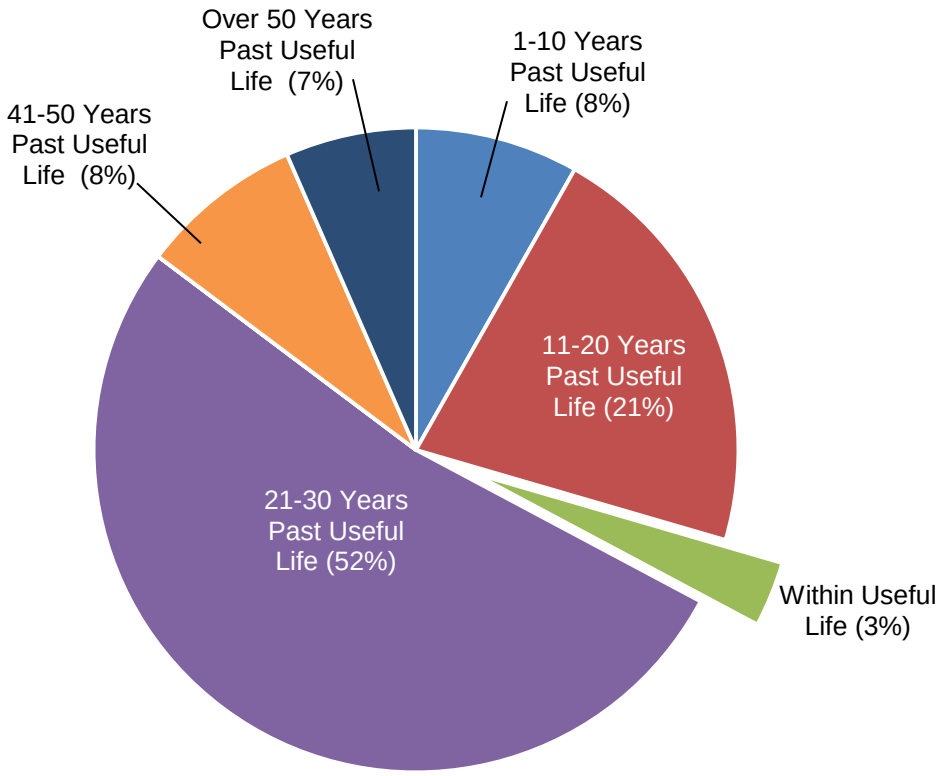


*These deficiencies are usually not apparent to the bridge user, but are important measures that indicate bridge inventory in need of repair or replacement.

PRODUCT FAMILY: **Bridges/Structures**

Backlog/forecasting analysis

King County has 61 vehicular bridges with timber components. Timber bridges are the portion of the county's bridge inventory most prone to deterioration. The typical design life for a timber bridge is 50 years. As illustrated in the graph below, most of the inventory already exceeds this, with all but two exceeding this threshold by 2026. These bridges require replacement to maintain functionality, but there is no planned investment for the next ten years due to the road funding crisis. Without replacement, at least two timber bridges could require closure by 2026.



PRODUCT FAMILY:

Drainage

What is it?

The drainage product family includes:

1. Conveyance systems that move water from one location to another. These include pipe networks, culverts, ditches, and catch basins.
2. Detention and treatment systems –such as stormwater ponds, rain gardens, vaults, and swales.

Desired attributes

- Meets safety and environmental standards
- Water on roadway causes minimal impact to travelers
- No water damage to infrastructure or private property
- Good water quality
- Ponds, ditches and enclosed drainage system free of litter/debris
- No mosquitos in road-related ponds or ditches

By the numbers

- Over **22,000 catch basins**
- **3 million estimated feet of pipe** in the system (more than two and one half times the distance between Earth and the International Space Station).
- **4.7 million feet of drainage ditches**

Purpose and relationship to network

Drainage infrastructure moves stormwater away from the roadway. Stormwater may originate from the road surface or from neighboring properties. Standing water can be a safety hazard to road users and accelerates the deterioration of the roadway surface and substructure.

Drainage infrastructure also reduces flood risk to the built environment (private and public property) by collecting and redirecting stormwater to natural bodies of water and designated collection points.

In addition, drainage infrastructure reduces water pollution by collecting stormwater and filtering out pollutants and sediment via settlement, infiltration, or other processes.

PRODUCT FAMILY: **Drainage**

Proposed 2017-2018 investment - $37 million
Operating and capital activities

Description

Drainage preservation**:** Major and minor drainage infrastructure repairs and replacement. Projects range from replacements of small segments of pipe, to large cross-culvert replacements with fish passable concrete box culverts.

Quick response**:** Funds to address unanticipated failures of the drainage system.

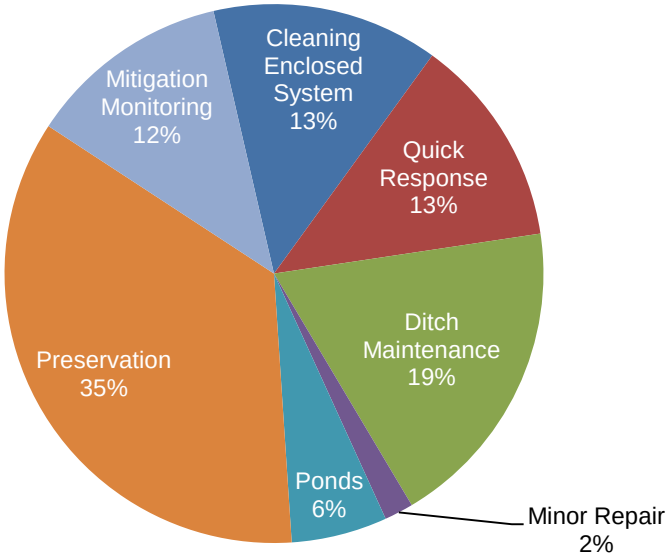
Cleaning enclosed system**:** Routine maintenance including pipe and catch basin cleaning, vactoring sediment, and small incidental repairs.

Ditch maintenance**:** Routine maintenance to remove sediment and debris, primarily performed through bucket ditching with a front end loader or a back hoe.

Minor repair**:** Minor repairs and tasks including pipe marking, repairing trash racks, preventing erosion, replacing rip rap, replacing catch basin lids.

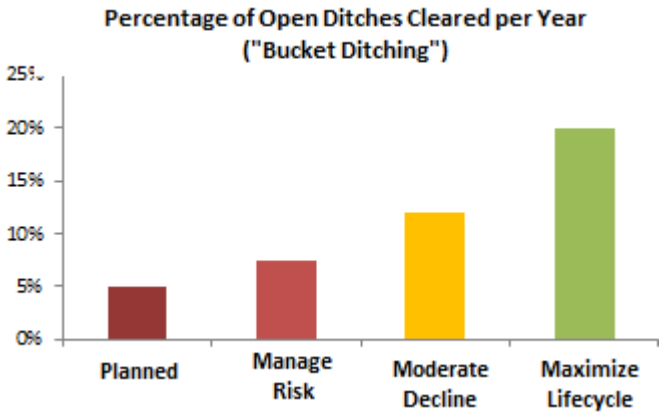
Ponds**:** Mowing, brush removal and cleaning of stormwater ponds.

Mitigation Monitoring: Site maintenance, monitoring, analysis, and reporting for projects sites that have required regulatory compliance.

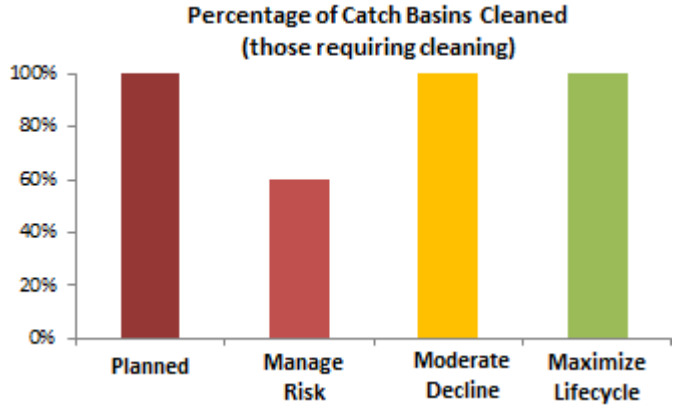


PRODUCT FAMILY: **Drainage**

Selected 2017-2018 planned accomplishment levels



Bucket ditching with heavy equipment is performed to keep drainage ditches free of vegetation, sediment and debris. Best management practices include leaving some vegetation in place to protect habitat areas which has an impact on the accomplishment rate.



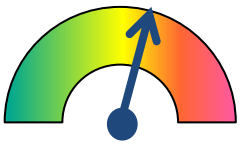
Catch basins are required to be inspected and cleaned in accordance with the county's National Pollution Discharge Elimination System permit. Roads has implemented Lean process improvements to enable compliance with increased inspection requirements.

PRODUCT FAMILY: **Drainage**

Expected results of 2017-2018 investment - customer experience

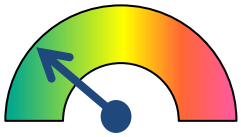
Desired attribute: Minimal standing water on roadway
Indicator: Number and duration of road closures due to water on roadway

- Significant
- Moderate
- Minor



Desired attribute: Good water quality
Indicator: Percent of required water quality monitoring results meeting standards

- 70-79%
- 80-89%
- 90-100%



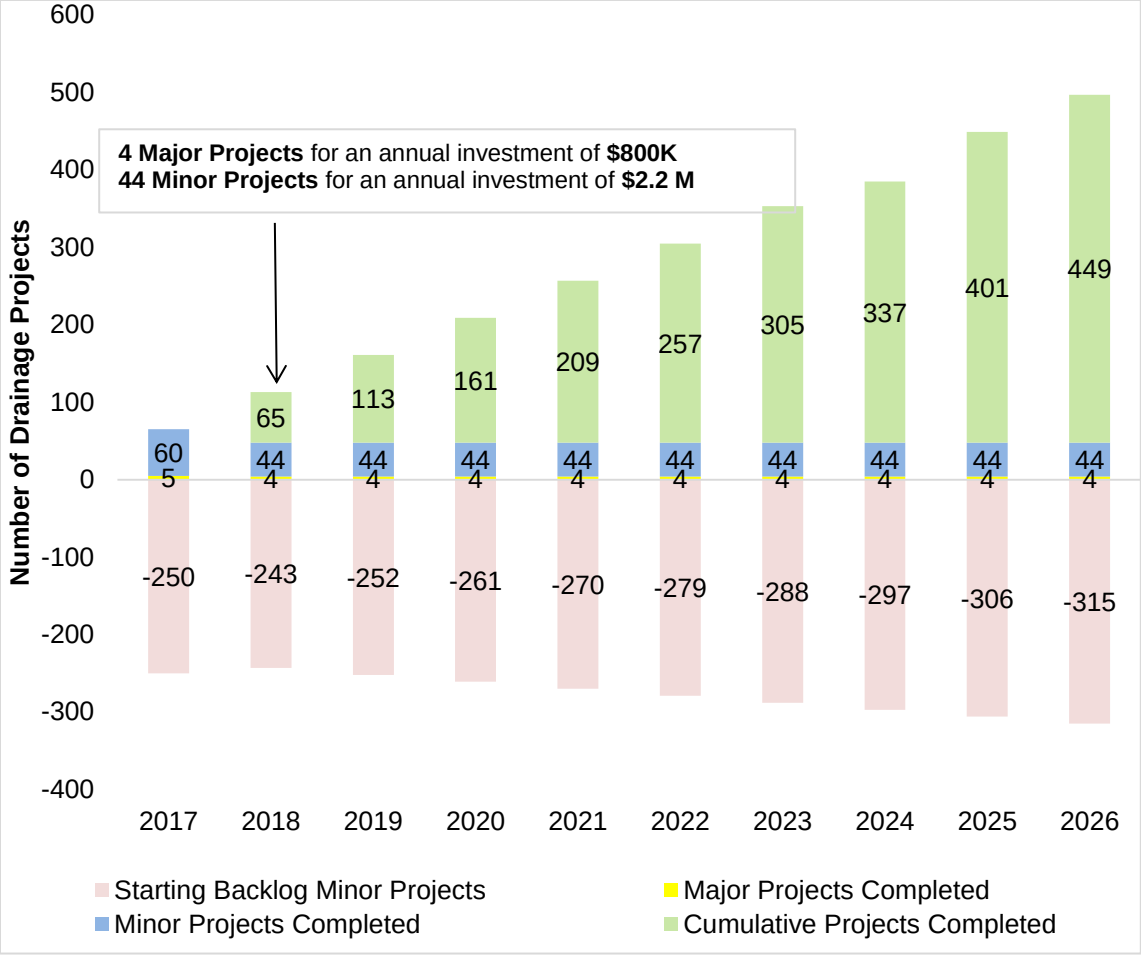
PRODUCT FAMILY: **Drainage**

Backlog/forecasting analysis

The forecasting for drainage is measured not by a quantity of assets, but by a number of projects at this time. There are nearly 2.9 Million linier feet of pipe and over 20,500 catch basins in the road inventory that are known today. A complete inventory and conditions are not known at the current time. There is a defined list of current projects identified by Road's staff. The project list grows each year as potential system failures are identified and are documented. With an annual investment of $4M in 2017 and $3M/year thereafter, the backlog of enclosed drainage projects is growing significantly.

Condition assessment and prioritization work completed in 2016 improved understanding. Based on this assessment, 121 major projects were added to the starting backlog for 2017.

State of the Drainage System—Enclosed Pipe and Culvert Replacements
Change in Backlog Under Current Investment Levels



PRODUCT FAMILY:

Traffic Control Devices

What is it?

The traffic control devices product family is a collection of devices and information systems used to regulate, warn, or guide traffic (vehicle and pedestrian). It is placed on, over, or adjacent to a roadway, pedestrian path, or shared-use path. Assets include the following:

- Signs (regulatory, warning, informational), pavement markings, street lighting
- Signals (flashers, traffic signals, controllers).
- Intelligent transportation system (ITS) equipment – cameras, electronic signs, license plate readers, traffic count stations, and other information gathering and communication devices.

By the numbers

- 78 **traffic signals**
- Over 44,000 **traffic signs**
- 52 **traffic cameras**

Desired attributes

- Meets safety standards
- Restrictions clearly marked
- Damaged signs replaced
- Traffic signs, stripes and markings visible night and day
- Intersections operating efficiently (for safety and optimal traffic flow)
- Traffic control systems operating correctly
- Information is accurate, clear, appropriate
- Free of graffiti

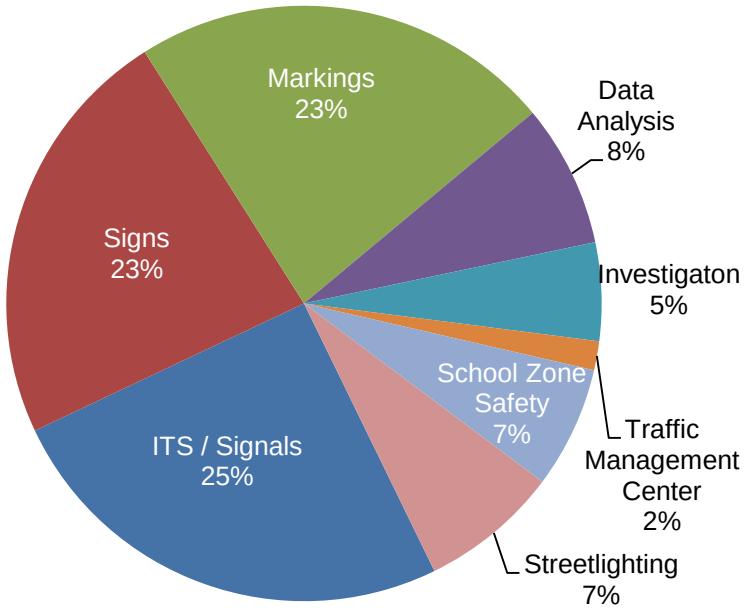
Purpose and relationship to network

Traffic control devices promote safety and efficiency, and can enhance transit speed and reliability by enabling the orderly movement of all road users on streets and highways.

ITS equipment provides real-time traffic information to traffic operators, the media, and the traveling public. The information network is designed to increase the safety and efficiency of roads and to inform drivers of adverse conditions such as accidents or congestion.

PRODUCT FAMILY: **Traffic Control Devices**

Proposed 2017-2018 investment - $20 million
Operating and capital activities



Description

Signals and intelligent transportation systems: Operating, maintaining, repairing and replacing traffic signals and all associated components such as controllers, lights, mast arms, timers, cameras, cabinets, and loop detectors.

Signs: Maintaining and replacing signs, including fabrication, installation, inspection and cleaning.

Markings: Maintaining and replacing pavement markings, including striping,thermoplastic and buttons.

Data analysis: Engineering tasks associated with traffic control operations, including signal studies and design, collision mapping and reporting, and level of service analysis.

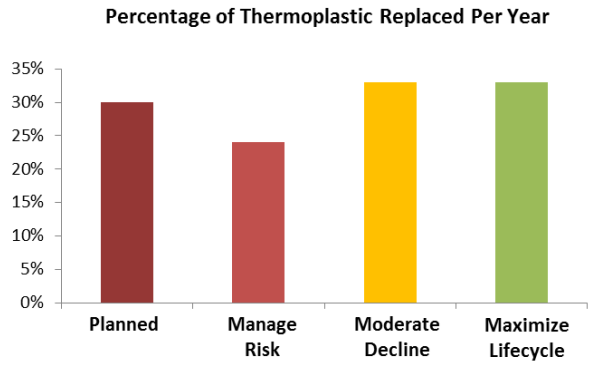
Safety investigations: Engineering tasks associated with traffic control investigations, including school safety, collisions, and citizen inquiries.

Traffic Management Center: Various components of traffic management systems (signals, control boxes, real time video) are monitored and adjusted in the center. Real-time traffic cameras and electronic messaging signs are also controlled and information is shared with the public.

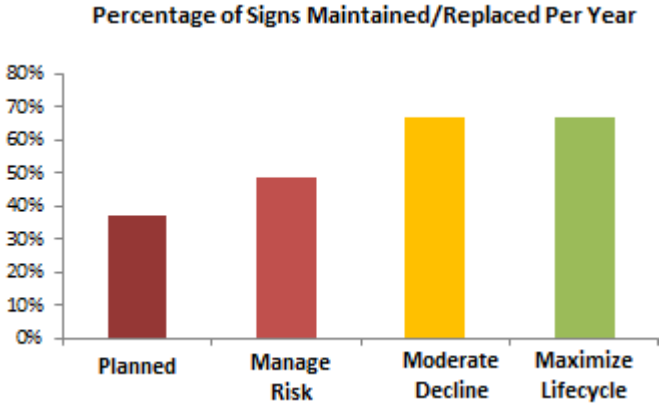
Street lighting: Operating costs for street lighting associated with safety and visibility.

PRODUCT FAMILY: **Traffic Control Devices**

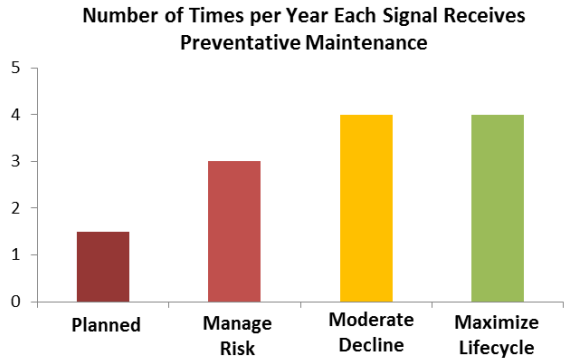
Selected 2017-2018 planned accomplishment levels



Thermoplastic materials are used for cross walks, stop bars, arrows, etc. They typically last three years before requiring replacement.



In addition to responding to "call-outs" from residents regarding sign-related issues, signs also need regular cleaning and replacement. All signs should be cleaned at least once per year, and replaced every 10 years as reflectivity is reduced.



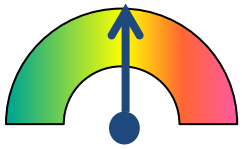
Signals are made up of hundreds of electrical components that require regular maintenance, replacements and upgrades to ensure functionality.

PRODUCT FAMILY: **Traffic Control Devices**

Expected results of 2017-2018 investment - customer experience

Indicator: Sign* replacement/repair response time in hours
Desired attribute: Damaged signs replaced

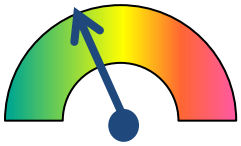
- 13 – 24 hours
- 7 – 12 hours
- 0 – 6 hours



*Applies to safety/regulatory signs such as stop signs, speed limit signs, etc.

Desired attribute: Signals operating correctly
Indicator: Number of signal failures per year

- 12 or more
- 7 – 12
- 0 - 6



PRODUCT FAMILY:

Roadside

What is it?

The roadside product family includes the various road system features and components that are within the road right-of-way but outside the travel lanes of the road. This includes sidewalks, pathways, shoulders, planters and landscape walls, roadside slopes, and ADA ramps. (Note: Drainage facilities may be located in the roadside area, but are treated as a separate product family.)

By the numbers

- 827 miles of roadway with gravel shoulders
- 73,000 feet of sidewalk
- **429 trees of concern** removed annually (10 year average)
- **2700 cubic yards of slide debris** removed from roadway annually (10 year average)

Desired attributes

- Meets safety and environmental standards
- Free of hazards/obstructions
- Good sight distance
- Guardrail where appropriate
- Vegetation does not interfere with road use
- Clear, unobstructed area for nonmotorized use and for vehicles that leave roadway
- Mitigation of slide and washout risk

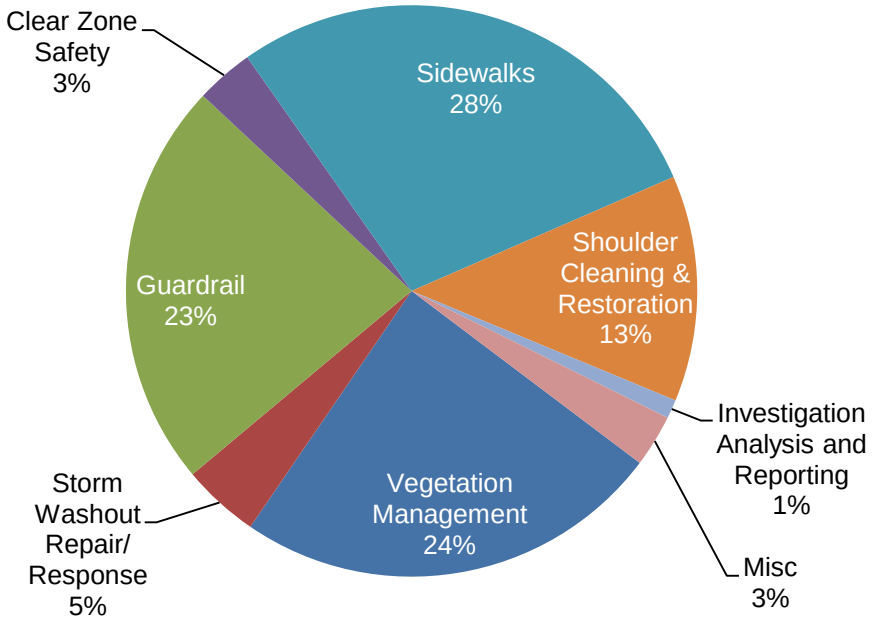
Purpose and relationship to network

Because the roadside product family contains a variety of elements, the purposes vary.

- Sidewalks, pathways and ADA ramps enhance pedestrian safety and mobility.
- Shoulders can provide space for slow-moving vehicles, disabled vehicles, nonmotorized travel, and construction and maintenance activities.
- Guardrail mitigates the impacts of run off the road collisions and helps to prevent vehicles from colliding with dangerous obstacles or vulnerable areas.
- The roadway and areas outside of travel lanes (medians, shoulders, etc.) may also contain above or below ground utilities that belong to other public or private entities.

PRODUCT FAMILY: **Roadside**

Proposed 2017-2018 investment - $50M
Operating and capital activities



Definitions

Vegetation management: Mowing and maintaining trees, brush and natural areas on the roadside, which provides clear sightlines for drivers, ensures water flow, and keeps traffic control signs, wayfinding signs, and traffic signals from being obscured. Overgrown vegetation on sidewalks, shoulders, and other walkways can lead to pedestrians walking in the roadway, and dangerous or downed trees can block roadways. Vegetation management includes regulatory compliance to control noxious weeds

Storm washout repair/response: Response to slide events, including bank stabilization, material removal and disposal, repairs, etc.

Guardrail: Upgrade existing guardrail and guardrail end terminals, raise guardrail to current standard height, and design and construct new guardrail systems.

Clear zone safety: Identify, and remove or mitigate objects next to roadways that vehicles leaving the roadway might otherwise hit, creating clear zones. These zones create space for a driver to stop safely or regain control of a vehicle that has left the road, increasing the possibility of a safe recovery and reducing the instances and severity of crashes.

Sidewalks: Grant applications have been submitted for two proposed projects constructing sidewalks and other improvements in the equity and social justice focus communities of Skyway and White Center. The Renton Avenue project, in the amount of $3.2 million, will construct a sidewalk, a paved walking surface and bicycle lanes within the project area, and complete some connections to recent safe routes sidewalk

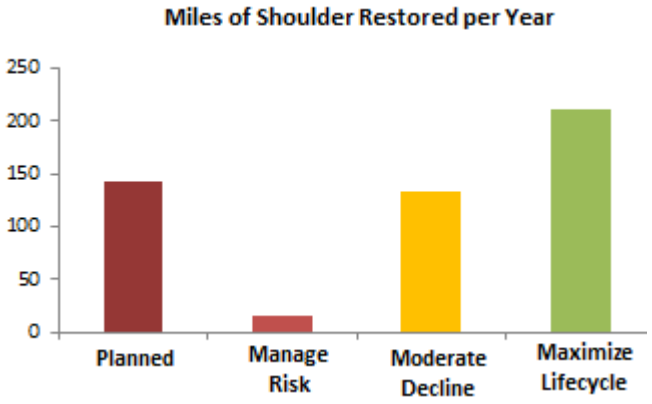
projects. The Highline School District project, in the amount of $5.3 million, will construct sidewalks and bicycle lanes, and install beacons within the project area, benefiting safe routes to schools.

Shoulder cleaning and restoration: Maintaining gravel shoulders, including gravel patching and grading, and removing vegetation. Maintaining shoulders prevents standing water and reduces deterioration of the roadway.

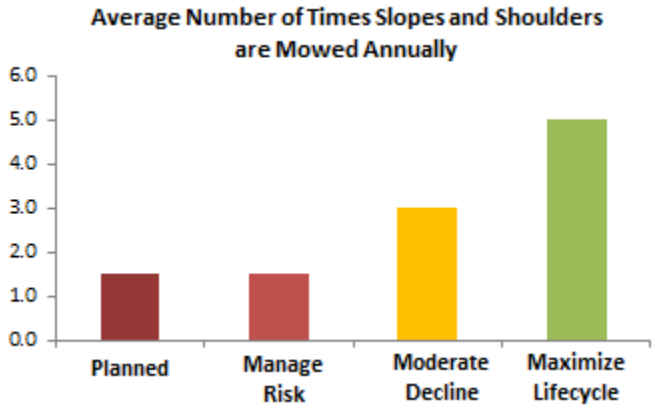
Investigation analysis and reporting: Engineering, monitoring and reporting tasks associated with safety investigations and response to citizen requests.

Miscellaneous: Minor maintenance of roadside features, including fence repair, hazardous material removal, repair of rock walls, and roadside debris/litter removal.

Selected 2017-2018 planned accomplishment levels



Shoulder restoration repairs degraded and rutted shoulders. Properly maintained shoulders facilitate good drainage and prevent standing water from impacting the roadway. They also provide a safe recovery area for vehicles that leave the traveled roadway. Funding is increased for this task to reduce roadway damage.



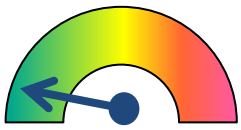
Slope and shoulder mowing serves a critical safety function by removing vegetation from lines of sight, from blocking visibility of traffic control devices, and obstructing pedestrian walkways. All slopes and shoulders should be mowed 5 times per year. Current funding for this task only provides for mowing slopes and shoulders 1.5 times on average per year. Critical slopes and shoulders may be mowed more than 1.5 times per year, while lower risk areas may not be mowed at all.

PRODUCT FAMILY: **Roadside**

Expected results of 2017-2018 investment - customer experience

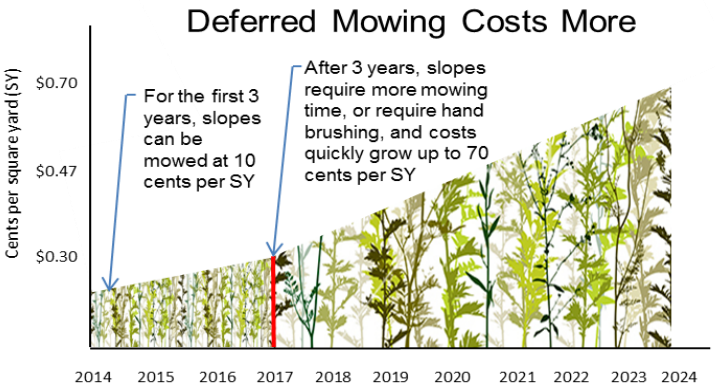
Desired attribute: Meet safety standards
Indicator: Percent of guardrail meeting standards/located in warranted places

- <50%
- 50 – 79%
- 80-100%



Backlog/forecasting analysis

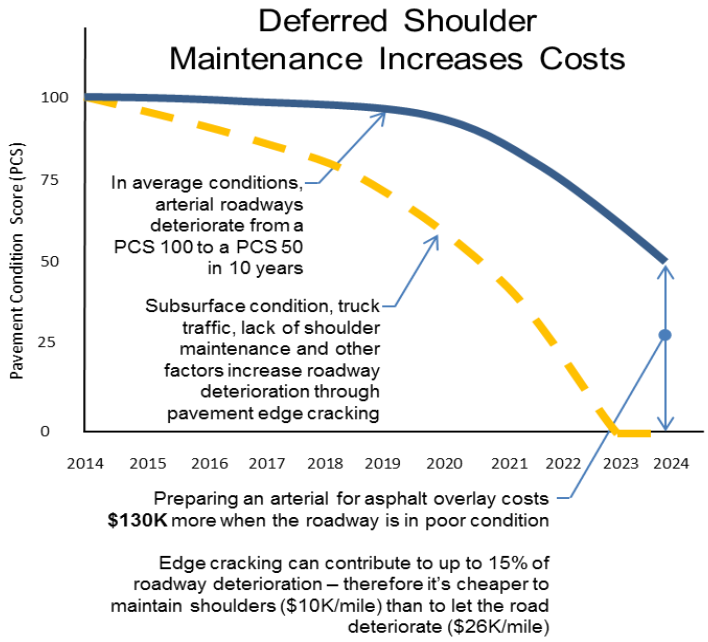
King County invests in roadside maintenance activities, such as mowing and shoulder maintenance, using a priority array of critical safety locations. These activities resolve vegetation and other safety related roadside issues. A backlog exists and investments are made to tactically address highest priority locations.



Deferred mowing can cost up to an additional

$9,000

per mile per year after 10 years



Deferred shoulder maintenance can cost up to an additional

$16,000

per mile per year after 10 years